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The ELECTRICAL REVIEW

FOUNDED 1872

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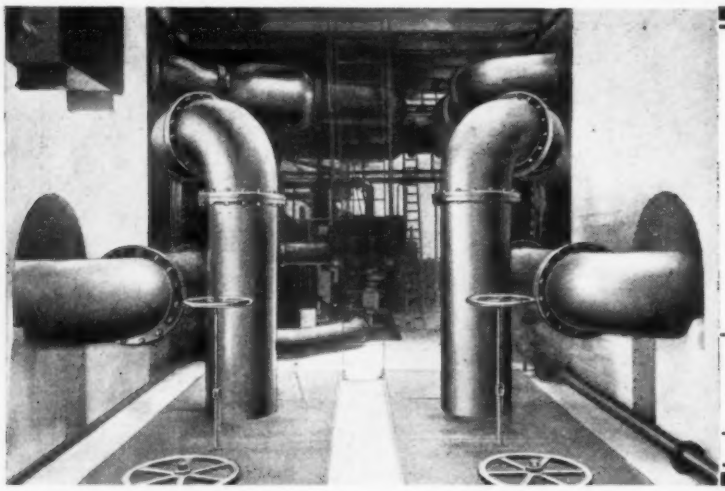

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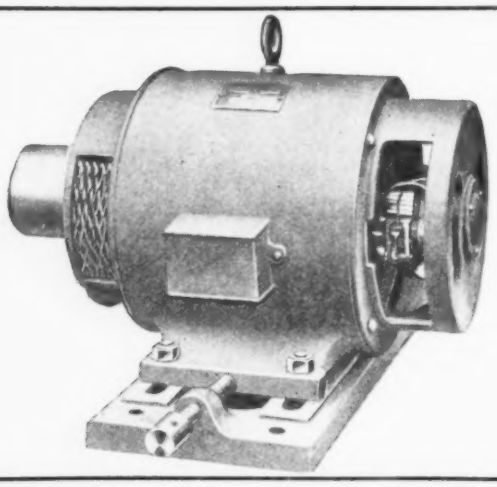

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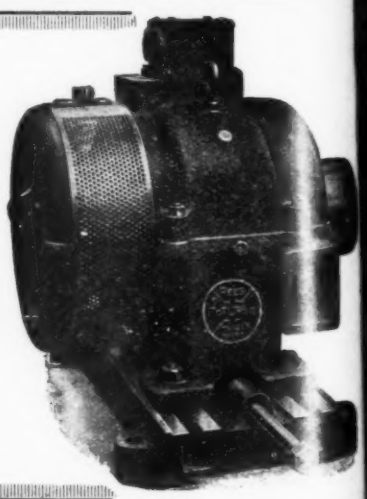

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The

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The Development of the Domestic Load.

LOOKING back on the work of the I.M.E.A. Convention at Brighton—a meeting which was smiled upon by Fortune, for it was favoured with all the amenities of fine weather, fair ladies, and pleasant surroundings—the dominant note of the proceedings appears to have been the importance of the domestic load in the development of the electricity supply industry; and that is as it should be, for in no other direction is there such enormous scope for profitable progress to be made, and no other type of load as yet in sight holds out equal promise of cheapening the cost of electricity by improving the shape of the day load curve. Moreover, there is good evidence that the domestic load can be increased with comparatively little effort, and the more it is developed the easier it will be to keep the ball rolling, for the cost of apparatus will diminish as the output increases, and the price of electricity will also be reduced.

In the course of his presidential address, Mr. W. C. P. Tapper proclaimed the determination of the Council to press for the extension of the powers of municipal authorised undertakers to include the sale of apparatus and the right to carry out wiring, and at the annual general meeting this principle was endorsed by the members, who unanimously adopted a resolution instructing the Council to take the necessary steps. In our opinion, the development of the domestic load which is indispensable to the future prosperity of the electricity supply industry can only be fully realised with the aid of hire-purchase and free-wiring schemes. The great obstacle to the expansion of the domestic load is not so much the price of electrical energy, as the initial capital outlay necessary to make use of it. The apparatus is costly to purchase outright; the municipalities are already authorised to let it on hire, and ought to be in a position to carry out hire-purchase schemes. But a still more important matter is the cost of wiring, which is probably the most difficult question of all to deal with. Prospective consumers who are in a position to pay cash for their installations, and who either own their houses or can make suitable arrangements with the owners, are not here referred to; the problem is confined to the very large class of small tenants who naturally decline to bear the cost of installing wiring for the ultimate benefit of their landlords, though they would gladly use electricity if they had the opportunity. It is useless to wait longer for the contractors to find a way out of this difficulty; they cannot afford to install the wiring on hire terms, nor are they in a position to negotiate with the land-

lords. To cope with this situation it is absolutely necessary for the supply authority to possess power to provide the wiring, on hire or hire-purchase terms, to deal directly with the house-owners, and to carry out to the full the principle of *continuous service* to the consumer, which, as we have stated without refutation, is not done by the contractor.

We do not suggest that supply authorities need do, or ought to do, a large proportion of the wiring in their areas; on the contrary, we hold that they should work in as close co-operation with the local contractors as possible, the latter on their part doing their utmost to assist in the development of the industry upon which both parties depend for their existence. But efficient service cannot possibly be given if the supply authority is debarred from undertaking the installation and repair of its own wiring and apparatus on occasion, and we maintain that such service is essential to the success of the development campaign. In Mr. L. L. Robinson's outspoken paper on "Installation Policy," which dealt frankly with these and kindred matters, special emphasis was laid upon the importance of the maintenance service, which must be prompt, efficient, and cheap; but the author, whilst insisting on the necessity of direct control over the wiring and installation work, by no means proposed to dispense with the assistance of the electrical contractors. He suggested that the latter should be invited to a conference to settle specifications and schedule prices, and that wiring jobs should be handed over to them by the supply authority; he had tried both methods, and had come back to this one. In the discussion, Mr. R. B. Mitchell stated that such a system was already in operation in Glasgow, where the electricity department did no wiring, but placed the work in the hands of contractors, with good results.

We cannot believe that by further opposing the free and untrammelled development of the municipal electricity supply departments, by resisting the grant to them of the full trading powers which are essential to their progress, the contractors will benefit either themselves or the public. Mr. Fedden pointed out that although his department possessed and had always exercised the right to do installation work, there were 100 contractors in Sheffield; but the difficulties in the way of making a municipal installation department pay its way are so great and so fundamental, being rooted in the very fact of municipal employment, that we believe very few undertakings would enter into competition with contractors. The urgent need is to popularise the use of electricity in the home to the utmost, to which end hire-purchase and free wiring would be highly conducive; and if contractors are not prepared to carry out these schemes, on an unlimited scale—as they are not—they will do well to refrain from hindering those who can and will do so, with their collaboration.

We have referred above to the cheapening of apparatus by increase of production; to this factor must be added organised research and standardisation as valuable means of reducing costs. A powerful plea for the support of research was put forward by Councillor W. H. Thickett in his paper, and was endorsed by Mr. Ll. B. Atkinson and the Electricity Commissioners. Already large economies have been effected by the activities of the Research Association, in many cases by authorities which have not contributed a penny to the support of that body, and there can be no doubt that money wisely spent in this way is a most profitable investment, while the scope for research has no limit. Standardisation, too, is a crying necessity; it grows by slow degrees if left to happen, but can be immensely accelerated by intensive cultivation. Mr. C. le Maistre uttered a word in season on this topic, and those who studied, for instance, the excellent exhibition of cooking apparatus in the adjoining building could see for themselves not only that standardisation in large measure was possible, but also that it was urgently necessary. For many years we have urged upon manufacturers the desirability of designing elements so that they could easily be replaced, and we are glad to see that the tide is flowing strongly in that direction; several cookers and radiators were thus equipped, so that to replace an element was almost as easy as to change a lamp. Fortunately, in these days of heating elements which seem to be of unlimited longevity, the operation is rarely necessary, but there are always exceptions, and delay in restoring a household appliance to working order is not only intolerable to the user, but, far worse, is a fertile topic for gossip which works untold harm.

In this connection we wish to congratulate the organisers of the Convention on the brilliant idea of holding a special meeting for women, at which several excellent papers were read, and the principle that women should be taught to use electrical apparatus to the best advantage was pressed home. The Electrical Association for Women deserves the strong support of the industry; its activities should benefit not only its members, but also the circles with which they are in contact, besides vigorously stimulating the adoption of electricity in the home, and on all grounds we hope that it will rapidly grow in membership and command the goodwill and encouragement of all branches of the electrical industry.

Natural and Artificial Sunlight.

THIS subject, discussed at the joint meeting of the Illuminating Engineering Society, the Sunlight League, and other bodies, on June 9th, illustrated very well the wide interests of the Society, and its instinct for choosing subjects that appeal to all classes of the community. The beneficial effects of sunlight on health, and its curative value, appear to be well established, and were treated in a very able manner in Dr. Saleeby's introductory address. Medical men, architects, and engineers all expressed their views in the discussion. To the electrical industry the question is main'y associated with smoke abatement, and the replacement of inefficient coal fires by electrical appliances. To the gas industry the question of smoke abatement makes a similar appeal. There is plenty of room for both to exercise efforts in favour of more scientific methods of using fuel. Electricity, however, finds further opportunities in lamps producing "artificial sunlight" for medical treatment, many examples of which were on view at the meeting. It is interesting to observe the importance that is now attached to the ultraviolet rays in sunlight, as an essential factor in health. Yet, but a short time ago, there were comments in the daily Press on alleged dangers from the relatively minute amount of ultraviolet radiation emitted by ordinary gasfilled lamps! The truth is that ultraviolet rays, like other natural phenomena, make a good servant but a bad master. They cannot be allowed to escape indiscriminately, but under proper control they are not necessarily detrimental, but may be of priceless benefit. Their occurrence and penetrative power were fully discussed by Mr. J. W. Ryde in our issue of June 5th. We cannot enter here into the debatable question of the comparative curative values of natural and artificial sunlight; but we may be sure that both have their uses, and our object must be to study the merits and limitations of each and to apply both in a scientific way.

The Industrial Situation.

WHILE in many directions there is evidence of industrial depression, the most unfortunate being the recent heavy increase in the unemployment figures, the electrical industry continues to flourish. The unemployment figures again afford the best measure of this prosperity, for from them (as published in the June *Ministry of Labour Gazette*) we see that while the general percentage of unemployment in the engineering industry was 11 per cent., in the electrical engineering branch

the proportion was only 5.7 per cent.; in marine engineering it was 18.6 per cent. In the electrical cable, wire and electric lamp manufacturing industries the percentage of unemployed was 7.8, and the figure of 8.9 per cent. was given for the electrical wiring and contracting industry. While these were less satisfactory than the electrical engineering figure, they still make a good showing in comparison with most other industries. From the unemployment figures relating to some other important branches we select the following:—Coal-mining, 15.8 per cent.; pig iron industry, 17.7 per cent.; boot and shoe industry, 10.1 per cent.; cotton trade, 7.6 per cent.; woollen and worsted trades, 17.8 per cent. So far as we can discover, only 15 branches of industry, some of them of small dimensions, showed a lower percentage of unemployed than electrical engineering, in a list of 100 trades. The general percentage of unemployed in Great Britain and Northern Ireland was 11.2.

Another indication of the satisfactory state of the electrical industry—satisfactory, at least, in the light of the general conditions—is the continued advance of our export trade. It will be observed from the statistics for May, which we reproduce in this issue, that as compared with May, 1924, there was an increase of £377,798, or over 25 per cent., in the value of electrical exports. The figures for the first five months of the year show a rise of £1,658,142. Imports have risen at the same time, and while this may not appear altogether satisfactory, it certainly indicates the existence of a greater electrical activity.

Municipal Housing Schemes.

THE extraordinarily rapid progress that is being made in the adoption of electrical cooking and other domestic aids is necessarily making itself felt in the rival camp, especially in the case of large housing schemes, such as those of Glasgow and Liverpool, where the Corporations are each equipping 1,000 houses with electric cookers.

In the past we have noted instances in which, to meet the objection of the Ministry of Health to the provision of both gas and electricity, gas alone has been installed in subsidised houses; we are pleased to see, therefore, that the Housing Committee of the Rochdale Corporation, confronted with the same criticism, has decided to equip a number of dwellings with electricity only. This decision is said to be experimental, but there is no reason to doubt its success, and we are not surprised to find in the editorial columns of our friendly contemporary, *The Gas World*, a vigorous protest against it.

Our contemporary admits that "a certain amount of expense can be avoided by confining the supply to gas or electricity," but is dubious as to the subsequent running expenses if the choice falls upon electricity. The saving in first cost has been estimated at from £30 to £10 per house. With all respect to the gas industry, we fail to see any good reason why it should claim the sole right to a monopoly in such a case. There will certainly be a saving in the cost of lighting; the cost of cooking will probably be about the same as with gas; neither gas nor electricity can be seriously considered for continuous heating, but for intermittent heating a good case can be made for electricity; and on the score of hygiene, comfort, and convenience, there can be no question as to the verdict. Hence we welcome the action of the Housing Committee, and are confident that the tenants will be well satisfied with it.

The Value of Annual Reports.

THIS season of the year witnesses the publication of a large number of the municipal electricity supply undertakings' reports for the year which closed in March. Most of these reports are simply presented to the local authority, adopted, and forgotten, and an excellent opportunity for forcible propaganda is neglected. There are very few supply undertakings in these days which fail to make continuous progress and show a profit each year, and as the unprofitable nature of State-owned or municipally-owned undertakings is so greatly stressed, the public would be very glad to hear of these exceptions. Many local papers cannot see the interesting "story" behind the bare statement of the financial results and are accordingly content to merely give these figures for what they are worth without any guidance to their readers. We are aware that very few undertakings have got so far as to appoint an official solely for "publicity" work, but we think that in every undertaking there should be somebody capable of writing up the report in an enlightening manner for circulation to the local Press.

Such matters are ordered much better in the United States. There, of course, the business is mainly in the hands of companies, which do not fail to make the most of their figures. Mr. C. H. Peirson, of the Southern California Edison Co., recently contributed an article to the *Electrical World* showing how his company makes its annual report secure the goodwill of the population of the 250 towns which it serves. It even goes to the length of analysing the report to show exactly how each district has benefited by the company's service, giving details of the money spent and to be spent in the future on lines and equipment. The co-operation of 170 newspapers is sought in presenting this information in a manner calculated to appeal to their readers, and the results have shown that the work involved is not wasted.

We are convinced that much good would come from the adoption of enterprising publicity efforts by British undertakings, especially by those under municipal ownership, for these have the advantage of being able to impress upon their people that the undertaking is theirs and that it is to their own advantage to use electricity, quite apart from the benefits which its use will confer.

International Conferences in France.

DURING the past ten days the third International Conference on Large Electric High-Pressure Systems has been held in Paris, and we are glad to learn from our correspondent, Mr. R. Borlase Matthews, that this year it has been more fully representative than on either of the former occasions, no fewer than 50 British delegates and members being present, as well as large numbers from other States. The importance of the E.H.P. Conference is recognised by the French Government, the President receiving the official delegates at his own residence, and Ministers attending some of the sessions. A mass of up-to-date technical information is accumulated at these Conferences, which should be of the greatest value to the engineers of all nations; the official record is published in French, but an English edition would be issued if an adequate demand were forthcoming, and we hope that all readers who are interested in modern practice in electricity supply will apply for copies of the report.

An exhibition devoted to hydraulic power has been opened at Grenoble, a busy town in the foot-hills of the French Alps. Like so many other exhibitions, it was officially opened when very incomplete, but it should be in good shape when the International Congress on Water Power commences next week (from July 4th to 11th). The organisers have had regard not only to "Houille Blanche," but also to the delectation of visitors on tour, and the combination of touristic activity with the utilisation of water power is of benefit to this extent, that those who, like Dr. Syntax, are in search of the picturesque, can see that so far from the use of water power invariably "spoiling the neighbourhood," as those who oppose such projects often aver, a number of artificial lakes have been created in mountainous districts, for example, in Italy, which are likely to become attractions in themselves to tourists.

A correspondent who has visited the spot recently informs us that those who visit Grenoble for the exhibition can get information regarding hotel or other accommodation by writing in advance to or calling at a special "Office de Logement" of the "Syndicat d'Initiative" at the railway station. Up to the present the charges for accommodation have been very reasonable, a matter of importance in these hard times.

The Municipal Electricity Undertakings of South Africa.

[By Our Special South African Correspondent.]

SOME twenty years ago we first published a list of South African municipal electricity undertakings of which there were then only seven in operation and three in progress, in addition to five company-owned undertakings supplying municipalities, totalling altogether only some 13,000 kW of plant. It will be seen from the accompanying table that considerable progress has been made consequent on the industrial expansion of a new country, there being now 65 municipal undertakings in operation with a total capacity of close on 97,000 kW.

The sizes of these stations are as follows: —

Capacity in kW.	No. of Stations.
1,000 to 22,300	8
400 to 1,000	6
300 to 400	5
200 to 300	11
100 to 200	21
40 to 100	100

In addition to these, there are 13 towns taking a bulk supply from private companies, mainly within the area covered by the Victoria Falls and Transvaal Power Co. around Johannesburg. The four principal towns in Rhodesia also own electricity undertakings

The diagram on p. 1006 represents the sale of energy and has been sub-divided to represent to scale the proportion sold by the various towns, from which it will be seen that Johannesburg and Durban between them supply just a little over one-half of the whole of the power sold by municipalities, Johannesburg being in excess of Durban only on account of its larger tramway output. (Traction sales are shown in black.)

It has to be remembered that South Africa covers a particularly large area, with towns and villages separated by many miles. The eight larger towns supply the bulk of the current, serving close on 81,000 consumers out of a total white population of 441,200 in those towns, while the remaining 57 plants serve only 19,000 consumers out of a total white population of 158,700, or a grand total of 100,000 consumers out of a total white population of close on 600,000. The capital expended upon these municipal undertakings totals over £6,300,000, while the yearly revenue amounts to about £1,530,000. Coal costs vary from about 10s. to 45s. per ton, the variations being largely due to the distance which the coal has to be carried, sometimes 200 miles or more, and naturally tariffs vary considerably in proportion.

Union of South Africa Municipal Electrical Undertakings (in order of Units sold).

Compiled by E. Poole, Assistant Borough Electrical Engineer, Durban.

The following Towns take supply in Bulk.

TOWN.	GENERATION.	DISTRIBUTION.	K.W. Installed.	UNITS SOLD.	TARIFFS. LIGHTING AND HEATING.	TARIFFS. POWER.	REMARKS.
Germiston, Transvaal	Bulk supply from V.F.P. Co., Ltd., 3ph. 50c. at 10,000 volts	A.C. 120v. Light, 3ph. 50c. 4w. A.C. 230v. Power	2,000	2,235,978	4d. Heating, 1½d. Room basis, 4d.; above min., 1½d.	3½d. to 1½d.	
Kimberley, Cape	Bulk supply from De Beers Co., Ltd., 5,000 v. at 3d. per unit	A.C. 440/220v. 3ph. 50c. 3w. ..	1,230	1,581,360	7d.	2½d	Trams also by De Beers Co
Benoni, Transvaal	Bulk supply from V.F.P. Co., Ltd., 3,000v. 3ph. 50c. at 1.03d. per unit	A.C. 346/230v. 3ph. 50c. 4w. ..	940	1,208,858	6d. to 4d. Cooking, 2½d.	2½d. to 1·6d.	
Krugersdorp, Transvaal	Bulk supply from V.F.P. Co., Ltd., at ½d. per unit plus 13/6 per k.w. max. demand	A.C. 420/240v. 3ph. 50c. 4w. ..	550	927,091	6d., 13 units, over 2d.	2d., 200 units over 1½d.	
Roodeport, Transvaal	Bulk supply from V.F.P. Co., Ltd., 3,300v. at 1¼d. per unit (av.)	A.C. 400/240v. 3ph. 50c. 4w. ..	385	503,810	7d., 14 units, over 2d.	2d.	
Boksburg, Transvaal	Bulk supply from V.F.P. Co., Ltd., 2,100v. 3ph. 50c. at 1¼d. per unit	A.C. 230v. 50c. 3w.	450	473,248	7d. to 4½d.	1½d.	Trams also (trolleys) Municipal
Vereeniging, Transvaal	Bulk supply from V.F.P. Co., Ltd., at ½d. per unit plus £10 per k.w.	A.C. 400/230v. 3ph. 50c. 4w. ..	135	270,653	9d., 6d. & 3d.	1½d.	
Springs, Transvaal	Bulk supply from V.F.P. Co., Ltd., at 1.41d. per unit	A.C. 230v. 3ph. 50c. 3w.	310	268,949	6d. to 3d.	2d. to 1d. ..	
Randfontein, Transvaal	Bulk supply from Randfontein Estates Co., Ltd., at 1½d. per unit	A.C. 420/240v. 3ph. 50c. 4w. ..	70	145,523	6d., 18 units, over 2d.	2d., 200 units over 1½d.	
Strand, Cape ..	Bulk supply from Cape Explosives Works, Ltd., at 3d. per unit, 3,000 volts	A.C. 380/220v. 3ph. 50c. 4w. ..	90	75,000	1/1	5d.	
Beaufort West, Cape	Bulk supply from S.A. Rlys. A.C. 3ph. 50c. at 4.25d. per unit	D.C. 480/240v. 3w.	40	44,983	1/3 to 10d.	6d.	
Somerset West, Cape	Bulk supply from Cape Explosives Works, Ltd., at 3d. per unit, 3,000 volts	A.C. 380/220v. 3ph. 50c. 4w. ..	150	44,514	1/-	3d.	—
Howick, Natal ..	Bulk supply from South African Rubber Manufacturing Co., Ltd., at 4d. per unit.	A.C. 220v. 2ph. 3w.	—	10,822	1/-, 10d. & 9d., less 10%	4½d.	—

Private Company Supply.

Butterworth, Cape	Gas & Water.	D.C. 220v.	D.C. 220v. 2w.	69	18,060	1/3	1/-	Veld... (own...

The following Towns are not classified as to output, units not being yet available:

Grahamstown, Cape	Steam. A.C. 3,300v. 50c. 3ph.	A.C. 415/240v. 4w.	420	—	9d.; cooking 3½d.	9d. to 2½d.	—
Volksrust, Transvaal	Steam. D.C. 440v.	D.C. 440/220v. 3w.	300	—	1/- & 11d.	3d.	—
Dundee, Natal ..	Steam. D.C. 220v.	D.C. 220v. 2w.	180	—	9d. & 8d.; domestic 6d.	6d.	—
Ficksburg, O.F.S.	Steam. A.C. 3,300v. 50c. 3ph.	A.C. 420/240v. 4w.	200	—	1/-. 9d. & 6d.; domestic 4d. ..	3d. to 2½d.	—
Barberton, Transvaal	Steam. A.C. 2,300v. 50c. 3ph	A.C. 420/240v. 4w.	183	—	1/- to 8d; 1/- to 9d. (shops); cooking 2d.		—
Graff Reinet, Cape	Steam. D.C. 460v.	D.C. 460/230v. 3w.	180	—	1/-	3d. & 1½d. 6d. to 3d. ..	—
Winburg, O.F.S.	Gas. D.C. 240v.	D.C. 240v. 2w.	100	—	1/- to 6d.	Cd. to 3d. ..	—
Kokstad, Cape ..	Steam. D.C. 440v.	D.C. 440/220v. 3w.	84	—	1/- lamp basis; 6d. above	—	—
Utrecht, Natal ..	Steam. D.C. 240v.	D.C. 240v. 2w.	40	—	1/- up to min.; 6d. above	—	—

Union of South Africa Municipal Electrical Undertakings—*Continued.*

TOWN.	GENERATION.	DISTRIBUTION	K.W. Installed.	UNITS SOLD.	TARIFFS. LIGHTING AND HEATING.	TARIFFS. POWER.	REMARKS.
Johannesburg, Transvaal ..	Steam. D.C. 600v. .. .. A.C. 3,300v. 50c. 3ph.	D.C. 460/230v. 3w. (Inner Area) A.C. 400/2v0v. 3w. (Outer Area)	22,300	44,197,556	Room basis, 6d.; above min. 1½d. 2 Rate 6d. & 1½d. to 2d.	(a) ½d. (b) 2 Rate, 6d. & 1½d. to 2d. (c) 1½d to ½d.	Trams also Municipal
Durban, Natal ..	Steam. D.C. 550v. .. .. A.C. 6,600v. 50c. 3ph.	D.C. 550/500v. .. .. .. A.C. 6,600v. & 550/500v. 3w. & 200v 4w., 100/200v. 1ph. 3w.	16,000	41,871,922	Norwich, 5d.; above min. ½d. 2 Rate, 5d. & 2d. Suburbs, 6½d. above min. 3d., also 7½d. & 1d.	2d. to 6d., plus 10%	Trams also Municipal
Cape Town, Cape	Steam. D.C. 500v. .. .. A.C. 2,200v. 50c. 2ph. A.C. 12,000v. 50c. 3ph.	D.C. 500v. .. .. A.C. 440/220v. 2ph. 3 & 5w. A.C. 380/220v. 3ph. 4w.	16,900	27,878,443	Lighting, 5d. Cooking, 1d. Special Hot Water ½d. Room basis, 5d.; above min. 1d.	2½d. to 1d., less 20%	Trams also & at Camps Bay. Priv'te Companies
Pretoria, Transvaal ..	Steam. A.C. 6,600v. 50c. 3ph.	D.C. 550/500v. 3w. .. .. A.C. 433/250v. 4w.	10,500	10,171,686	Norwich, 6d.; above min. 2d. 2 Rate, 6d. & 2d.	3d. to ½d. ..	Trams also Municipal
Port Elizabeth, Cape ..	Steam. D.C. 500v. .. .. A.C. 6,600v. 50c. 3ph.	D.C. 500/250v. 3w. .. .. A.C. 113v. 1ph., 500/250v. 2 & 3w. A.C. 6,600 & 500v. 3ph.	9,500	6,401,753	7½d. & 1½d. Heating only, 1½d. 2 Rate 7½d. & 3d.	1½d. to ½d...	Trams also Municipal
Bloemfontein, O.F.S. ..	Steam. D.C. 550v. .. .. A.C. 3,300v. 50c. 3ph.	D.C. 550v. .. .. A.C. 347/200v. 3 & 4w.	2,650	4,366,275	Norwich, 10d.; above min. 2½d. & 1d., also 10d. to 6d.	1d. to 1½d...	Trams also (railless) Municipal
East London, Cape ..	Steam. A.C. 6,600v. 50c. 3ph.	D.C. 550v. .. .. A.C. 380/220v. 4w.	4,050	4,123,421	9d. 2 Rate, 9d. & 3d. Cooking, 9d.	3d. to ½d. ..	Trams also Municipal
Pietermaritzburg, Natal ..	Steam. D.C. 550v. .. .. A.C. 3,300v. 60c. 3ph. A.C. 2,100v. 100c. 1ph.	D.C. 550v. .. .. A.C. 200v. 2w.	3,640	3,501,805	7½d. to 5d. Heating, 1½d.	2d. to ½d. ..	Trams also Municipal
King William's Town, Cape ..	Steam. A.C. 2,300v. 50c. 3ph.	A.C. 220v. 2w.	600	931,724	1/-, less 25%. Heating, 3d. to 1½d.	3d. to ½d. ..	—
Kroonstad, O.F.S.	Steam. D.C. 500/250v... ..	D.C. 460/230v. 3w.	600	908,953	9d. to 3d.	4d. to 1½d. ..	—
Ladysmith, Natal	Steam. D.C. 440/220v... ..	D.C. 440/220v. 3w.	435	700,684	Norwich, 8d.; above min. 3d. to 2d. 2 Rate, 8d. & 3d.	3d. to 1d. ..	—
Bethlehem, O.F.S.	Steam. D.C. 500v.	D.C. 500/250v. 3w.	303	396,245	1/-, 75 units, 9d. above, Heating, 3d.	2d. to 1½d...	—
Potchefstroom, Transvaal ..	Steam. D.C. 500/250v... .. A.C. 3,300v. 50c. 3ph.	D.C. 480/240v. 3w. .. .. A.C. 380/220v. 4w.	605	388,862	8d., 20 units 4d.; above min., 7/0 ..	3d. to 1½d., min., 5/-	—
Queenstown, Cape	Steam D.C. 440v. .. .. & Oil. A.C. 3,300v. 50c. 3ph.	D.C. 440/220v. 3w. .. .. A.C. 420/240v. 4w.	318	268,370	9d. & 6d., also 4d. to 1½d.	4d. to 1½d. ..	—
Mossel Bay, Cape	Steam. A.C. 3,300v. 50c. 3ph.	A.C. 400/230v. 4w.	200	351,560	1/11½, less 10%. Cooking 4d. to 1½d.	1½d... ..	—
Pietersburg, Transvaal	Steam A.C. 3,300v. 50c. 3ph. & Gas.	A.C. 420/240v. 4w.	300	336,200	Norwich, 1/-; above min., 3d. ..	3½d. to 2d...	—
Klerksdorp, Transvaal	Steam. D.C. 480v.	D.C. 460/230v. 3w.	160	333,550	Norwich, 9d.; above min., 2d. 2 Rate, 9d. & 3d	3d. to 2d. ..	—
Worcester, Cape	Steam, Oil & Water. D.C. 484v... ..	D.C. 440/220v. 3w.	427	295,500	10½d. to 8d. Special, 5d. Domestic, 4d. to 1d.	4d. to 3d. ..	—
Standerton, Transvaal ..	Steam. A.C. 3,300v. 50c. 3ph.	A.C. 420/240v. 4w.	250	283,719	Room basis, 9d.; above min., 3d. Shops, 6d. Heating, 1½d.	1½d... ..	—
Uitenhage, Cape	Oil. D.C. 440v.	D.C. 440 220v. 3w.	270	282,869	1/-, less 20%	4½d... ..	—
Paarl, Cape ..	Water. A.C. 3,300v. 50c. 3ph.	A.C. 380/220v. 5w.	225	270,723	10d. to 3d.	2½d. to 1d...	—
Oudtshoorn, Cape	Oil & Steam. D.C. 440v.	D.C. 440/220v. 3w.	365	226,048	1/- to 9d. Domestic, 1½d. & 2d. ..	4½d. to 2d...	—
Harrismith, O.F.S. ..	Steam. A.C. 2,000v. 50c. 1ph.	A.C. 200v. 3w.	200	225,030	1/- to 9d. Domestic, 4d. Shops, 6d.	4d. & 1½d ..	—
Stellenbosch, Cape	Oil. D.C. 480v.	D.C. 440/220v. 3w.	140	220,000	10d. & 8d.	3d. & 2d. ..	—
Wellington, Cape ..	Gas, Steam & Water. D.C. 440v. ..	D.C. 440/230v. 3w.	165	193,966	1/-, above min., 4d.	4d. to 2½d...	—
Vrede, O.F.S. ..	Steam. A.C. 2,200v. 50c. 3ph.	A.C. 415/240v. 4w.	170	176,500	Room basis, 1/3; above min., 3d. ..	2d.	—
Windhoek, S.W.A. ..	Steam. D.C. 440v.	D.C. 440/220v. 3w.	200	12,304 (1 month)	1/9	9d. to 7d. ..	—
Middelburg, Transvaal ..	Steam. A.C. 3,300v. 50c. 3ph.	A.C. 420/240v. 4w.	200	11,500 (1 month)	Room basis 1/-; above min. 3d. ..	4d. to 1½d.	—
Ermelo, Transvaal ..	Steam. D.C. 500v.	D.C. 500/250v. 3w.	225	133,594	1/- to 9d.	4d. to 1½d.	—
Greytown, Natal	Steam. D.C 220v.	D.C. 220v. 2w.	118	129,119	1/- to 3½.; heating 3d.	3d. to 1½d.	—
Aliwal North .. Cape	Water & Oil. D.C. 500v.	D.C. 460/230v. 3w.	170	117,485	2/3; above min. 6d. & 4d. (lamps installed.	4d. to 3d. ..	—
Vryheid, Natal ..	Steam. D.C. 500v.	D.C. 500/250v. 3w.	150	111,893	Norwich 10d.; above min. 4d. or 10d. to 8d.; shop windows 6d.	4d. to 1d. ..	—
Cradock, Cape ..	Oil. D.C. 450v.	D.C. 440/220v. 3w.	220	109,190	1/-	4d.	—
Frankfort, O.F.S.	Steam & Water. A.C. 2,200v. 50c. 3ph.	A.C. 415/240v. 4w.	250	99,581	Room basis 1/-; above min. 3d; shops 6d. & 3d.; cooking 1½d. less 15% to 20%	1½d. less 10 to 20% ..	—
Heilbron, O.F.S.	Gas. D.C. 250v.	D.C. 230v. 2w.	115	99,518	Lamps installed 1/-; above min. 3d.; hotels, shops 1/-, 6d. & 3d.	3d.	—
Heidelberg, Transvaal ..	Gas. D.C. 500v.	D.C. 460/230v. 3w.	70	97,233	min. at 1/2; above 7d.	5d. & 4d. ..	—
Parys, O.F.S. ..	Steam & Water. D.C. 460v.	D.C. 460/230v. 3w.	140	83,823	9d. & 6d.	3d. & 1d. ..	—
Umtata, Cape ..	Oil. D.C. 440v.	D.C. 440/220v. 3w.	137	83,734	1/3 for min.; above 6d.; or 1/3 less 20%.	6d. to 5d. ..	—
Robertson, Cape	Steam. D.C. 440v.	D.C. 440/220v. 3w.	150	79,924	1/- to 10d.; Heating 4d.	4d. to 2d. ..	—
Somerset East .. Cape	Oil. D.C. 238v.	D.C. 220v. 2w.	70	77,304	1/- to 9d.; Bioscopes 1d. to 7d. ..	6d. to 3d. ..	—
Lindley, O.F.S....	Gas. D.C. 230v.	D.C. 230v. 2w.	90	6,460 (1 month)	10d.	4d	—
Senekal, O.F.S...	Gas. D.C. 500v.	D.C. 460/230v. 3w.	75	76,400	Norwich 1/-; above min. 2d.; shops 1/-, 6d. & 2d.	4d. to 2d. ..	—
Rustenburg, Transvaal ..	Steam. A.C. 2,200v. 50c. 3ph.	A.C. 416/240v. 4w.	100	75,000	1/-; above min. 6d.; business 1/- & 9d.	10d. to 8d.	—
Newcastle, Natal	Steam. D.C. 500v.	D.C. 460/230v. 3w.	120	70,191	1/- to 9d.	5d. to 1½d.	—
Alice, Cape ..	Gas. D.C. 440v.	D.C. 440/220 3w.	80	68,300	Norwich 1/-; above min. 4d.; cooking 2d.	—	—
Indwe, Cape ..	Steam D.C. 250v.	D.C 250v. 2w.	75	62,500	6d.; above 20 units 3d.	—	—
Middelburg, Cape	Oil & Gas. D.C. 460v.	D.C. 440/220v. 3w.	108	54,080	1/3 less 20%; bioscopes 7½d. ..	From 4d. ..	—
Caledon, Cape ..	Gas. D.C. 460v.	D.C. 460/230v. 3w.	130	48,900	From 1/-	6d. to 3d. ..	—
Burghersdorp, Cape ..	Oil. D.C. 460v.	D.C. 440/220v. 3w.	118	47,774	1/3 first 10 units; then 1/- less 20%	—	—
Bethal, Transvaal	Steam. D.C. 250v. .. .. & Gas.	D.C. 250v. 2w.	65	47,742	1/3	4d.	—
Malmesbury, Cape	Gas. D.C. 440v.	D.C. 440/220v. 3w.	200	40,350	1/-	4½d. ..	—
Estcourt, Natal ..	Steam. D.C. 440 v.	D.C. 44 /220v. 3w.	50	38,710	1/- to 8d.	6d.	—
Molteno, Cape ..	Oil. A.C. 2,000v. 50c. 3ph...	A.C. 420/240v. 4w.	100	27,239	1/3 less 20%; or 1/3 & 6d. over min.	1½d day .	—
Brandfort, O.F.S.	Steam. A.C. 2,000v. 50c. 3ph.	A.C. 420/240v. 4w.	100	14,200	1/- to 7d.	6d. even'ng	—
Riversdale, Cape	Oil. D.C. 500v.	D.C. 440/220v. 3w.	—	3,205 (3 months)	1/3 shops; or 5d. less 20% domestic	5d. to 4d. less 20%	—
Ceres, Cape ..	Water & Oil. D.C. 110v.	D.C. 110v. 2w.	60	11,000	1/-	—	—

The following Towns are now putting down Plants or have them under consideration:—

Mafeking (Cape), Humansdorp (Cape), Cathcart (Cape), George (Cape), Reitz (O.F.S.), Rouxville (O.F.S.).

Rhodesian Municipal Plants.

Bulawayo ..	Steam. A.C. 50c. 3ph.	A.C. 200/115v. 50c. 3ph.	625	725,212	1/8 to 8d.; special 2d. to 1½d. ..	5d. to 2d. ..	—
Salisbury ..	Gas. A.C 2,300v. 50c. 3ph.	D.C. & A.C. 440/220v. 3w. ..	600	547,000	1/6 to 6d.; heating 6d ..	3½d. to 2d.	—
Gwelo ..	Steam. D.C. 240v. ..	D.C. 240v. 2w.	100	103,156	1/3 to 6d.	1/- to 4d. ..	—
Umtali ..	Steam. A.C. 2,200v. 50c. 3ph.	A.C. 415/240v. 50c. 3ph. 4w. ..	100	84,300	2/- to 10 units; above 1/6	—	—

At Durban, which has the cheapest tariff in the Union, the lighting and domestic rate is on a flat rate of 5d. or on the "Norwich" system of 5d. and $\frac{1}{2}$d., less 10 per cent. for prompt payment, while motive power is on a sliding scale from 2d. to .6d. per kWh. Going to the other extreme we find in some of the smaller towns a lighting rate as high as 1s. 3d., with power at from 9d. to 3d.

There is a large variety of plant; 37 stations are steam-operated, the other plants being eight oil, eight

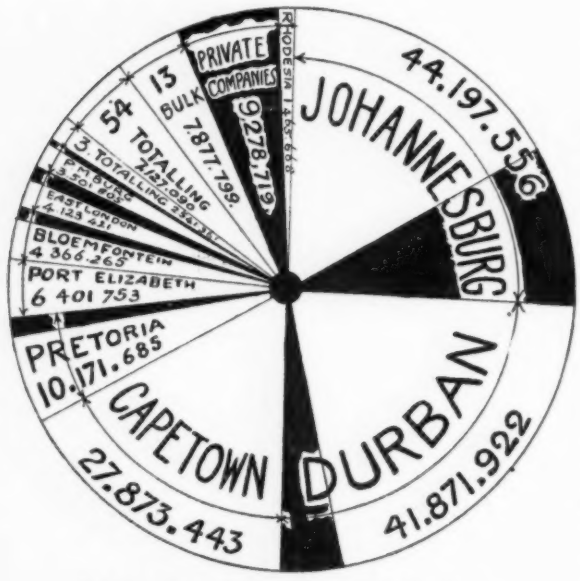


Diagram showing the Production of Electricity by the Principal Towns.

gas, and twelve with a combination of either, while in a few instances small water sources have also been harnessed as a stand-by.

The number of towns served by d.c. are 39, and by a.c. 19, while there are seven towns using both. The larger towns have mostly fallen into standard practice with three-phase, 6,600 V, 50 cycles, but there is, unfortunately, no uniformity in the voltage of supply in the several towns. It is to be noted, however, that the Association of Municipal Electrical Engineers at the recent Durban Convention approved of 220 V as the standard pressure (in the case of three-phase 200 to neutral), so that we may see this uniformity at a later date.

The low-pressure distribution in most of the towns is by means of bare overhead wires, as with the distances apart of many of the houses in some towns the cost of underground cables would be prohibitive, and the ease with which the overhead mains may be extended or added to as the load grows has much in its favour.

The next few years will no doubt see many changes in the matter of generation, as since the passing of the South African Electricity Act of 1922 and the coming into being of the Electricity Supply Commission, as well as the Electricity Control Board, large power stations are bound to take the place of many of the stations now in existence which will then take their supply in bulk. The super-power station at Colenso has already started running while other similar stations are in hand at Witbank in the Transvaal, and at Capetown, and an agreement has just been arrived at by which the next super power station will be erected at Durban to be in operation by October, 1927.

With the electrification of the railways in various parts of the country and the interconnection of some of the super power stations through the transmission lines along the railway routes, many smaller towns may eventually be provided with electricity, and even now Ladysmith, in Natal, is preparing to take a supply in bulk. This will naturally tend to a large increase in demand, especially in the case of the smaller towns whose tariffs would be reduced considerably, seeing that they would then avoid their present heavy generating costs. Fresh industries will, no doubt, be established, and the development of the heating and cooking load may certainly be the outcome, and Durban's example of ever-increasing demands in this regard will be followed in other towns of the country where electricity has no rival, and climatic conditions, as well as the domestic servant problem, demand such an efficient agent.

The Institution of Electrical Engineers.

Summer Meeting at the South-Midland Centre.

(*Concluded from page* 965.)

On Thursday morning, June 11th, the party drove 30 miles to Rugby in charabancs, passing through Stonebridge, the pretty villages of Meriden and Allesley, and the ancient city of Coventry, now famous for its production of cycles and motor-cars; it is also the location of the B.T.-H. magneto and radio apparatus factories, the (G.E.C.) Peel-Conner telephone works being at Stoke, about two miles out of the city.

At Dunchurch, the headquarters of the Gunpowder Plot conspirators, a branch road was followed to Rugby,

Photo by] Members of the Institution of Electrical Engineers

where a tour of the extensive works of the British Thomson-Houston Co., Ltd., of which an account was published last week, was undertaken; a display of kinematograph pictures had been arranged for those ladies who preferred not to inspect the works, and photographs were taken of the various parties as they were piloted through the shops. An excellent luncheon was provided by the company, the speeches being amplified by means of loud-speakers.

Arriving at the Austin Motor Co.'s Works.

Leaving Longbridge for Droitwich.

The erection of the Rugby factory commenced 25 years ago, when the B.T.-H. Co., then primarily a contracting concern, moved from Bankside in London and began to develop its manufacturing facilities on a large scale. The company employs 11,000 people, and its capital amounts to £5,100,000. The Rugby works, a feature of which is the great variety of the products, extends over 90 acres, with a floor space of 1,250,000 sq. ft., in addition to which an auxiliary factory is devoted to the manufacture of lighting fittings, the lamps themselves being made in the main works. In 1912 a one-acre factory, with a floor space of 90,000 sq. ft., was acquired at Coventry for the production of magnetos and similar small apparatus, while in the following year the Willesden works, with a floor area of 277,000 sq. ft., were built on a 9-acre site near London for the manufacture of switchgear. In 1919 a fourth factory was purchased in Birmingham; it covers 70 acres, has a floor space of 287,000 sq. ft., and is devoted to the production of a.c. and d.c. motors and generators. Glass bulbs for incandescent lamps are made at Chesterfield, the site of the works being 20 acres and the floor space 52,000 sq. ft., and in 1923 additional factory buildings with a floor area of 100,000 sq. ft. were acquired at Coventry for the manufacture of radio-telephone apparatus. The B.T.-H. Co.'s manufacturing facilities will thus be appreciated; it is alive to the possibilities, and by virtue of its close connection with the Power Securities Corporation (a financial institution) there is every probability of still greater development in the near future.

Leaving Rugby early in the afternoon, the party drove to the county town of Warwickshire, the route being, by permission of Lord Leigh, through the extensive Deer Park and past Stoneleigh Abbey, the modern residence of Lord Leigh, erected on the site of an old abbey which was purchased by his ancestors in the time of Elizabeth; a portion of the original monastic buildings is still to be seen.

The Stourport Generating Station.

The President (Mr. W. B. Woodhouse) at Droitwich.

On the Lawn at Warwick Castle.

Whichever way Warwick is approached, an entry must be made through one of the old gates in the town walls, two of which are still crowned picturesquely with chapels. From Saxon times the Earls of Warwick have

and their Ladies at Warwick Castle. [F. R. Logan.

played influential parts in English national affairs, "Warwick the King Maker" being a well-known character to students of history. The castle was never captured, and consequently it has remained intact in much the same state as it was during the Wars of the Roses; the interior has, however, been modernised a good deal. On arrival the visitors were accorded a civic reception (the Mayor can be seen in the adjoining figure, reading the address of welcome), and the official photograph was taken prior to the tour of the castle State rooms. Tea was provided on the castle lawn by the Leicestershire and Warwickshire Electric Power Co., Ltd., the Midland Electric Light & Power Co., Ltd., and the Leamington and Warwick Electrical Co., Ltd.

Photo by] [*F. R. Logan.*

Disembarking at Stourport.

The return to Birmingham was made by charabancs, and in the evening the General Electric Co., Ltd., gave a very successful ball and excellent cabaret entertainment at the Witton Magnet Club, supper being served in the lounges and on the verandah at the front of the club.

On Friday, June 12th, the last circular tour of the trip commenced with a 25-mile run into Shakespeare's country, passing through the district which at one time

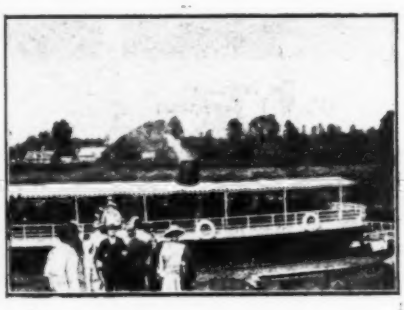
Photo by] [*F. R. Logan.*

The Mayor of Warwick Reading an Address of Welcome.

Benedictine Abbey; all that now remains of the latter is the pinnacled bell-tower on the river lawn. Evesham is to-day the market town of the Vale and a favourite holiday resort; the long-promised supply of electricity will, the Shropshire, Worcestershire, and Staffordshire Power Co. hopes, be available about September next. On their arrival the visitors were received by the Mayor, and after luncheon as the guests of the City of Birmingham Electricity Supply Department, spent the afternoon on the River Avon and in the riverside gardens.

After tea the party returned to Birmingham for the gala night at the botanical gardens, being received by the President and Mrs. Woodhouse, who were supported by Mr. W. Lawson (chairman of the S. M. Centre) and Mrs. Lawson. The guests danced, listened to music, commented on the garden illuminations, and finished supper in time for the fine display of fireworks, the evening winding up with the announcement of the result of the raffle of an Austin two-seater motor-car and electric consolation prizes, all of which went to Birmingham people. For demonstration purposes, a 24/55-h.p. six-cylinder Wolseley landaulette was fitted with a Metro-Vick standard 5-valve broadcast radio receiving set with one extra high-frequency valve. The aerial was approximately 9 in. above the roof of the car, and had about 80 ft. of wire; the earth lead was taken direct to the chassis of the car. Loud-speaker results were obtained

At Salter's Hall, Droitwich, after Lunch.



Embarking at Holt Fleet for Stourport.

A Halt at Stratford-on-Avon.

was covered by the great Forest of Arden. At Stratford-on-Avon some of the party visited the poet's birthplace, but the short halt did not permit more than a glimpse of the Memorial buildings by the river, the Guild Chapel (1427), the Clopton 15-arch bridge (1490), and other "shrines."

The drive continued up into the Worcestershire Hills through Broadway, one of the delightfully attractive villages that retain pretty nearly the appearance they presented at the height of their prosperity in the 14th, 15th, and 16th centuries when the Cotswold Hills were the home of the nation's wool industry. Proceeding into the fertile fruit-growing Vale of Evesham, due south of Birmingham and just north of the Worcestershire Cotswolds, famous in times gone by as the scene of Simon de Montfort's defeat, and the site of the great

at full strength up to about 15 to 20 miles while the car was in motion. This varied according to locality, and in one particular portion of the run, loud-speaker reception was obtained while the car was approximately 35 miles from the Birmingham station. While the car was stationary it was possible to get good loud-speaker results practically anywhere. It was found that the best reproduction and strength of signal were from the Chelmsford station. While the car was running, the magneto caused interference on this wave length. Four special transmissions were sent from the Birmingham station, and were received at Droitwich and at Evesham.

Capt. H. Hooper, local hon. secretary, and the organising committee can look back upon a wholly successful and thoroughly enjoyable outing.

The International E.H.P. Conference.

By R. BORLASE MATTHEWS, Wh.Ex., A.M.I.C.E., M.I.E.E., F.R.Ae.S.

THANKS to the efforts of the special Committee of the Institution of Electrical Engineers, supported by the publicity given by the ELECTRICAL REVIEW, nearly fifty Britishers are attending this Conference at Paris this year, as compared with only four (including the present writer) who attended the first meeting, held four years ago. Great Britain is not the only nation that is realising the great importance of this Convention, for the attendance from other countries is likewise increasing, and the Conference is becoming truly representative of the leading authorities upon this subject. The number of papers presented was rather large—no fewer than 98. The British papers were invited by the special I.E.E. Committee, and when ready were submitted to the I.E.E. Papers Committee. A number of those from other countries had not passed through such a process, and hence the general standard was not so good, though there were many excellent records of work done. On the whole, there seems to be a tendency on the part of Continental engineers to discuss some questions which are out-of-date and settled, as far as England, and in particular the I.E.C., is concerned, *e.g.*, in connection with transformer oils, earthing of the neutral, &c. That is to say, while there is undoubtedly much room for development and improvement, the foreign discussions rather turned on past history instead of attempting to delve into the future.

The I.E.E. Committee had been asked to make suggestions for improving the organisation of the Conference, with the result that this year matters are proceeding even more smoothly than on previous occasions. In particular, the translations of the speeches into English were made by British or American engineers, and in this connection the names of Mr. MacMahon and Dr. Mailloux may be mentioned with the grateful thanks of those Continental and British delegates whose knowledge of French was not as good as it might be.

France treats this Conference very seriously; her Ministers attend the more important functions. Her President (M. Doumergue) did the Conference the great honour of officially receiving the principal delegates (some thirty in number) at the Palace de l'Élysées. The British delegates who had the honour of being presented were Messrs. W. B. Woodhouse (Vice-President of the E.H.P. Conference), A. Page, P. V. Hunter, S. C. Bartholomew; H. E. Midgley, and R. B. Matthews. The President, a shrewd, short, intelligent man, received the delegation in a most friendly fashion, and after the formalities, showed his guests personally into his *sanctum sanctorum*, the famous Josephine room, where, alone of all the rooms in the Palace, the President is allowed to remain undisturbed.

The President had done the Conference the honour of studying its programme, and remarked upon the importance of the work it was doing for the world in general and France in particular. As head of the British delegation, Mr. W. B. Woodhouse received a special word of welcome. When one of the delegates was presented, it was mentioned that he was particularly associated with the applications of electricity to agriculture; the President's face lighted up, and he said a few words to him, emphasising the importance of that question for France, and stating that he (the President) took a special interest in the matter. Subsequently, arising out of these few words, the President entered into a brief discussion on the subject of electro-farming and its prospects with the chairman of the delegates (M. Legouez) and the secretary (M. Tribot-Laspière).

The President and the delegates were subsequently photographed together.

The meetings of the Conference were held in what was formerly a mansion of Solomon de Rothschild, a beautiful house with a fine garden. The latter was a pleasant place to which to escape from the heat of the Conference room, which was rather over-crowded.

Among the novelties of the papers may be mentioned the illustration of some of France's 89 super-power outdoor sub-stations by stereoscopic lantern slides (viewed through red and green anaglyoscope spectacles) and the illustration of a paper on "Rural Distribution" by the writer by means of a kinematograph film, prepared by E.D.A., of applications of electricity to farming.

The gist of the more important papers read at this Conference will be presented in a future article.

(To be continued.)

Electrical Activity in Japan.

Supply and Traction Developments.

CONSIDERABLE activity in the Japanese electricity supply and traction industries is reported, and the following notes give particulars of some of the most important undertakings which are in hand or in prospect.

In the supply branch it is reported that the Kochi Prefectual Office has decided to erect a steam power station, with a capital of 500,000 yen, for the object of starting the supply of power to local works, &c.

A sum of 21,000,000 yen has been set aside by the Railway Department for building six steam power stations during the next six years, each station having a capacity of 20,000 kW.

The Oji Paper Mill Co. has decided to build the second power station in the Hokkaido district at a cost of 2,300,000 yen.

An application for permission to establish the Changtsin-kiang Electric Co., with a capital of 200,000,000 yen, fully paid up, has been sent in by persons connected with the Mitsubishi firm. The object is to harness the Changtsin-Kiang a branch stream of the Yalu River, and to generate electricity. The total power generated will be about 350,000 kW, and seven sub-stations will be erected.

The Sendai Municipality plans erecting a steam power station at an early date.

The Tachiyama Suiryoku Denki K. K., with a capital of 3,500,000 yen, has decided to extend its power plant by building the Minowa power station, with a capacity of about 6,000 kW. The cost of construction is put at about 2,000,000 yen.

Among other power-station projects are the following:—The Tokyo Dentō K. K., three stations of 50,000, 70,000, and 20,000 kW respectively at Senju, Tsurumi and Kamagawa; the Tobo Denryoku K. K., a 70,000-kW station at Tsurumi; the Gumma, Denryoku K.K., a 10,000-kW station at Kawasaki; the Kinugawa Suiden K.K., a 12,000-kW station at Sumida; and the Tokyo Denryoku is erecting a 20,000-kW station. In addition, the last concern has a 100,000-kW scheme in prospect, and if it should be realised, the total power in a few years to come will reach 360,000 or 370,000 kilowatts.

The Fujigawa Denryoku K.K. (the Fujigawa Electric Power Co., Ltd.), is being organised.

As regards traction developments, it is stated that the promoters of the Hanshin Kokudo Denki Tetsudo K. K. were to meet on May 9th, as the application for charter had been granted. The company is to have a capital of 10,000,000 yen.

The Hiroshima Municipality is considering the running of a municipal electric tramway in the town. The cost of construction of the tramway is estimated at 6,800,000 yen.

An application for charter has been filed for the Idzu Electric Railway Co., which is to have a capital of 3,000,000 yen and construct a line 25 miles long.

The Tokyo-Yokohama Electric Railway Co., successor to the Musashi Electric Railway Co. which has a capital of 5,000,000 yen, will run its first line from Chofu station on the Meguro-Kamata Railway to Yokohama for a distance of 10 miles. It is projected to finish the construction works on the line by the end of this year, but a delay may be unavoidable. Two other lines are to be constructed after the completion of the above line.

The Osaka Kido Denki Tetsudo K. K. is raising its capital from 21,750,000 yen to 40,000,000 yen in order to rapidly construct a line about 13 miles in length.

The formation of the Bingo Electric Tramway Co., with a capital of 1,500,000 yen, is under consideration.

The running of electric trains on the Tokaido line is being prepared for by the Railway Department, and traffic will be opened at first on the Tokyo-Yokosuka section and the Tokyo-Odawara section in about November next by the use of 24 electric locomotives. The department had 42 electric locomotives before the earthquake, but some were destroyed in the earthquake in Yokohama. Locomotives made by the English Electric Co., Ltd., have arrived recently to take the place of those destroyed. The Department has three electric locomotives made by the Hidachi Works (Japan), and has obtained successful results in their trial running.

The generators, transformers, electric locomotives, rails, &c., to be purchased by the Railway Department on account of its electrification programme, are estimated at the value of over 10,000,000 yen for this fiscal year. The manufacturers connected with the Department are privately moving for the acquisition of the business.

The Incorporated Municipal Electrical Association.

Annual Convention at Brighton.

(*Continued from p. 992.*)

On Wednesday, June 17th, the programme already outlined was duly carried out. Mr. L. L. Robinson's paper on "Installation Policy," of which an abstract follows, had been the subject of interest in anticipation, and certainly gave rise to an animated discussion, to which so many members wished to contribute that the time available had to be parcelled out, and several speakers were requested to forward the remainder of their remarks to the Association's *Journal*. After Mr. Robinson had briefly summarised his paper, Mr. F. W. Purse opened the discussion with a lively onslaught, but failed to reach the subject of wiring regulations before "time" was called. Mr. S. E. Fedden followed with a vigorous defence of the paper, which was "after his own heart." Miss M. Partridge urged that electricity must be treated as a necessity, like water and air, and that women should be helped to learn its advantages for themselves. Mr. W. F. T. Pinkney advocated the strengthening of the E.C.A., and Mr. W. Riggs voiced the feelings of that Association with regard to the paper. Mr. R. B. Mitchell said that full powers for selling were necessary, but his department gave out wiring to contractors at agreed schedule prices. Mr. H. Marryat pointed out that if contractors did not continuously bring in new consumers, they could not exist. Ald. W. Walker advocated close co-operation with contractors, and a central showroom; he backed the wiring regulations, and condemned lampholder adapters. Mr. A. H. Shaw approved of handing work to contractors, but objected to any increase in the sizes of flexibles, and would retain adapters in use. Mr. J. W. Beauchamp outlined a scheme for securing uniformity of practice and collaboration with contractors, and Clr. W. H. Hennessy uttered an impassioned protest against the admission of "capitalists" to the discussion. Mr. A. H. Dykes approved of the wiring regulations as suggestions for good practice, but would have only a few mandatory rules; Mr. J. R. Dick also supported them as standards, but not as regulations, and the author briefly replied to the discussion.

In the afternoon a large party went for a charabanc drive along the coast to Worthing, Goring, Rustington, Littlehampton, and Arundel, whilst another contingent visited the Worthing power station. The chief item of interest in this Diesel station was a Fullagar engine and dynamo made by the English Electric Co., Ltd.; this engine was of the 2-cycle 6-cylinder type with opposed pistons, giving 785 kW with a guaranteed consumption of 0.408 lb. of oil per b.h.p.-hr. at full load, and 0.460 lb. at half load, at 250 r.p.m. Other sets included a Mirrlees, Bickerton & Day 4-cycle single-acting engine and Crompton dynamo giving 345 kW at 200 r.p.m., with a full-load consumption of 0.65 lb., a similar set of 260 kW installed in 1914, two Mirrlees-Peebles sets of 125 kW each, and a Mirrlees-G.E.C. 4-cycle set of 345 kW. It was interesting to observe the progress in design from 1912 to 1925; the new Fullagar set of 785 kW occupies practically the same space as an older set of less than half that output.

Refreshments were provided by the chairman of the Electricity Committee, Councillor W. E. Wenban-Smith, and a vote of thanks to him and to Mr. G. Porter, the electrical engineer, proposed by the President, was heartily accorded.

Photo by] **The I.M.E.A. Convention at**

In the evening there was an I.M.E.A. gala night at the "Regent," the huge dance hall, picture theatre, restaurant, &c., of which the electrical equipment was described in the ELECTRICAL REVIEW of January 20th, 1922. The remarkable lighting effects were very much admired, and dancing was kept up until a late hour.

On Thursday morning the Convention sat to hear and discuss a paper by Councillor W. H. Thickett, of Grimsby, on the question: "Are supply undertakings doing their utmost to develop the demand for electricity?" The author dwelt upon the necessity of research and standardisation, to reduce the cost of production, and to facilitate the general adoption of electricity. Opening the discussion, the President emphasised the importance of supporting not only the Research Association, but also the Standards Association and the Development Association. Mr. Ll. B. Atkinson said the production stage of the industry must now be followed by the distribution stage, which involved the education of the public. As indicating the value of research, he instanced the development of artificial silk as the outcome of Swan's experiments on the production of lamp filaments, and he appealed for the support of research by the public authorities. Mr. A. C. Cramb (hon. secretary) read a letter from the Commissioners stating that the Government grant to the Research Association would probably be reduced, and suggesting that authorised undertakers and others directly concerned should supply the deficiency. Mr. C. le Maistre pointed out that standardisation reduced the cost of manufactured goods and raised their quality, and Mr. J. W. Beauchamp advocated educational propaganda. Ald. O. Jamison urged that the Associations should be supported, Councillor W. Hammer deprecated over-statement of the advantages of electricity to people of modest means, and Councillor Higgins described the Glasgow system for dealing with small installations. Councillor J. Connolly blamed Councils and councillors for retarding progress, and Councillor W. Tummon touched upon statutory restrictions, whilst Ald. Senington said they ought to cheapen electricity. Ald. Mrs. Hammer appealed for support for the Electrical Association for Women, and the author of the paper, in reply, referred to the vast field for further development.

In the afternoon a large party drove to the Brighton Corporation's generating station at Southwick, of which

we gave some particulars in our issue of June 12th; Mr. G. Claughton conducted the visitors round the works. Afterwards the party proceeded in motor coaches to the Kemp Town sub-station, which is remote-controlled, containing Bruce-Peebles motor-converters and Reyrolle switchgear, as described in the ELECTRICAL REVIEW of October 24th, 1924, and finally the North Road sub-station (the old generating station, now containing 12,000 kW of converting plant) was visited under the guidance of Mr. J. Christie, borough electrical engineer.

The annual dinner was held in the Dome on Thursday evening, the attendance numbering about 400. Mr. W. C. P. Tapper presided, and was supported by the Mayor and Mayoress of Brighton and the Mayor and Mayoress of Stepney. Proposing the toast of "The I.M.E.A.," Mr. W. W. Lackie, Electricity Commissioner, who had formerly been a member of the Associa-

the Royal Pavilion, Brighton. [*Nias, Brighton.*

tion for 24 years, said that the Electricity Commissioners recognised the value of the work done by the Association, and that at no time had the Association been more necessary than at present. They were on the eve of great developments in the use of electricity, and the Commissioners were anxious that supply authorities should encourage research by contributing to the funds of the Research Association. They were sorry to lose Mr. Page, but the appointment of Mr. S. L. Pearce in his place was a source of consolation. Mr. Lackie concluded with a tribute to the splendid work of the President, who, in responding, referred with gratification to the formation of the Electrical Association for Women, and expressed the gratitude of the I.M.E.A. to the municipal authorities of Stepney and Brighton for their unstinted contributions to the success of the Convention. To Mr. J. Christie, in particular, he tendered special thanks.

Ald. W. Walker proposed "The Ladies and Guests," and Col. R. K. Morcom responded on their behalf. During the dinner selections on the organ were given by Mr. Norman Richards, and a programme of music under his direction followed.

Friday morning was devoted to the annual business meeting of the Association, which was held in the Royal Pavilion, Mr. W. C. P. Tapper presiding. The report of the Council was received and adopted, as were also the accounts. A long discussion took place on the precise form of a resolution authorising the Council to take steps to secure wider powers for municipal supply undertakers. The result of the election of officers and members of Council was declared, as follows:—President, Mr. R. B. Mitchell, chief electrical engineer and manager, Glasgow Corporation electricity department. Vice-president, Mr. R. W. L. Phillips, chief engineer, Bedford. Members of Council, Messrs. S. E. Fedden (Sheffield), R. A. Chattock (Birmingham), S. T. Allen (Wolverhampton), W. C. P. Tapper (Stepney), and Ald. J. A. G. Beaumont (St. Marylebone), and Clr. J. Moore (Cheltenham).

In the afternoon the electricity works of the Corporation of Eastbourne was visited, a large party enjoying the long drive *via* Newhaven and Beachy Head, in faultless weather; tea was provided by the Eastbourne Electricity Committee for the visitors on their arrival, after which the station was inspected, and Mr. J. K. Brydges, electrical engineer to the Corporation, and the Electricity Committee were thanked for their hospitality. The recent extensions at Eastbourne were described and illustrated in the ELECTRICAL REVIEW of May 9th, 1924, the chief item being a 2,500-kW Allen-G.E.C. 50-cycle turbo-generator running at 3,000 r.p.m.—said to be the largest single-phase set in this country. It was noteworthy that this set occupied about the same floor space as a 1,500-kW set—also running at 3,000 r.p.m.—which was installed in 1912, and about the same as a 750-kW set running at 1,500 r.p.m. installed in 1907. A Ferranti vertical engine installed in 1901, driving a 400-kW generator, was an interesting feature of the plant; it is still used on occasion. The Allen-G.E.C. set is supplied with steam at 250 lb. per sq. in. by a large Stirling boiler, the rest of the plant operating at 150 lb. pressure. There are some 300 single-phase motors connected to the mains, the largest being of 45 h.p.; the tariff is 4½d. for lighting and 1d. for power, heating, and cooking.

For Friday evening a second Gala night at the Regent was arranged, but the main business of the Convention was over. The weather was propitious from start to finish, and congratulations are due to the retiring Pre-

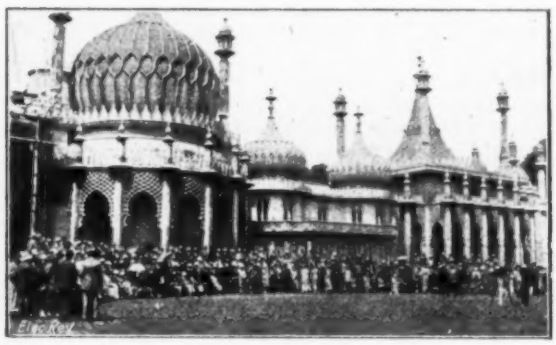
The Royal Pavilion.

Mrs. Atkinson and Mr. R. A. Chattock.

Mr. W. M. Rogerson.

Mr. Gibson and Mr. H. T. Harrison.

sident, Mr. W. C. P. Tapper, and the officials and organisers on their good fortune in this respect, which combined with their efficient arrangements to place this Convention in the category of the most successful in the history of the Association. Special credit was due to Mr. A. C. Cramb, hon. secretary, and Miss Lanfear, secretary, whose foresight, omniscience, and resourcefulness were as usual beyond all praise. To Mr. John Christie and his assistants the Association was also deeply indebted for their untiring efforts, which in very large measure contributed to the success of the Convention—the largest ever held by the I.M.E.A.



The I.M.E.A. at the Royal Pavilion.

Street Lighting.

THE paper on this subject, read by Mr. Haydn T. Harrison, was abstracted in our last issue. Opening the discussion, Mr. S. B. LANGLANDS (Inspector of Lighting, Glasgow Corporation), said that whilst the author stated that the average cost of street lighting throughout the country was 5.3d. in the £, in Glasgow it was only 3.83d. in the £, and he did not think that it was the worst lighted city in the kingdom. There were reasons, however, why the figure should be lower in the case of London. The City of London, for instance, had a valuation of £6,000,000 and 25 miles of streets, whereas Glasgow had a valuation of £7,000,000 and 500 miles of streets. At the same time, London, as a whole, if it were not a conglomeration of local authorities each of which was its own lighting authority, but one authority as was the case in Glasgow, would be able to do very much better than it did. He did not like the idea of street lighting being placed under the superintendence of the police, as suggested in the paper; the best plan was to have a lighting inspector who worked harmoniously with the gas and electrical engineers, as he did, in order to obtain the best results. On the question of glare, it almost seemed that the general public clamoured for it, because in the case of two streets in Glasgow, one of which was generally regarded as efficiently lighted and the other was not, the public preferred the latter apparently because the individual lamps gave a stronger lighting effect, although, taking this particular street installation as a whole, the lighting was poor. Side-street lighting, again, was a difficulty because the streets were often regarded as poorly lighted when, in fact, they were not, having regard to their needs, and any complaints made with regard to them arose from the contrast between their lighting and the lighting of the main thoroughfares.

Mr. J. CHRISTIE (Brighton), described the steps that had been taken to improve the street lighting, especially the lighting of the front, at Brighton since the war, during which time, of course, the lighting was blacked out, with the result that the fittings, switches, fuses &c., became derelict. At first, when funds were low, 300-W, 50-V lamps were used in series on the old arc lamp posts using the old round globes, but this was very inefficient and unsatisfactory. Later, with the assistance of Mr. Harrison, using the arc lamp posts which were put up 20 years ago, but with new lanterns, which he regarded as the finest columns in the country—1,500-W, 50-V gas-filled lamps in series were installed, and they had given complete satisfaction. In the main thoroughfares from 500- to 1,000-W gas-filled lamps were being used according to the requirements, whilst an American type of lighting had been adopted for the Valley Gardens in the centre of the town. This form of lighting had been adopted in some of the finest parks in American cities and was very effective. Then, for some alterations on the western lawns, a type of lighting was being adopted which would give various colour effects, using 200- and 100-W lamps when required, as for instance on gala nights. The charge on the rates for street lighting now amounted to 6d. in the £, and he hoped not so much that the charge would be reduced in the future as that more lighting would be given for the same money. At present the Brighton streets were almost entirely lighted by electricity, the number of gas lamps being only 230 or 240 out of a total of 4,000 street lamps. Indeed, the gas company had asked the Corporation electricity department to let their maintenance staff look after these gas lamps, cleaning and replacing mantles, and so on, because it did not pay the company to do it itself. Moreover, these gas lamps were in areas which had been condemned and when they were re-built he hoped they would be electrically lighted. The gas lamps cost £4 2s. 6d. per post per annum for a 4 ft. per hour burner, and the electric lamp posts were costing £3 18s. The big lamps on the front, which ran from dusk until 1.30 a.m., cost £30 a year. The charge for current is now 2d. per kWh, as against 1.66d. pre-war, so that considering the increase in the cost of coal, labour, &c., the increased charge was not excessive.

Councillor LONGLEY (Bradford), spoke of the street accidents in Bradford which some people alleged were due to the street lighting; steps were being taken to improve it, although at present there were only 350 electric lamps out of a total of 13,000. A Joint Committee of the Watch Committee and the Finance Committee had been formed and as it was obviously too large an undertaking to deal with the whole city at once, a scheme had been devised by which the main roads on which the trams were running would be dealt with first, electric lamps being hung from the tramway standards, and subsequently other areas would be dealt with in turn, the whole city covering an area of 23,000 acres. The Lighting Committee was not being made responsible for this work, but the Joint Committee, which had been formed was being advised by an independent expert, so that the best positions for electric and gas lighting could be decided upon without prejudice. On matters of detail arising out of the paper, the speaker recommended that in connection with side street lighting the names of the streets should be made visible at night. Then as to the use of reflectors, did not these cut down the efficiency of the lamps considerably, or alternatively increase the cost to obtain the same lighting?; again, was it not better to use smaller units in case of failure, rather than a smaller number of large units? As to the spacing of lamps, he thought the suggested 150 ft. too large a distance between lamps; in Bradford the maximum was to be 120 ft. At present, with some posts 102 ft. apart, the lighting was not so good as it might be. In connection with cost, the street gas lamps in Bradford cost, on the average, £5 a year each, and the street electric lamps £5 17s. a year each.

Mr. H. J. HALL (Electric Street Lighting Co.), speaking on the question of glare in street lighting, said this could be overcome in two ways, either by the use of sprayed bulbs or by the use of ground glass or similar bowls on the posts. Even if the former were used in reflecting or refracting fittings, this would not materially affect the efficiency because the efficiency was derived from the upper hemispherical distribution. Even if the lamps were fully sprayed, this enlarged the source from which the light was derived and that widened the angle at which the light was distributed. On the other hand, if a focusing medium were placed between the reflectors and the street, it quite altered the distribution of the light. In some cases this was an advantage, whilst in others it was not. Therefore, it was essential that engineers should tell the manufacturers the exact conditions under which fittings and lamps were to work if the best results were to be obtained.

Mr. E. E. HOADLEY (Maidstone), said that a good many towns, like Maidstone, were too small to be able to have a lighting inspector and in such cases the street lighting was generally vested in the Highways Committee, and the official of that committee was generally the Borough Surveyor who, as a rule—there were some exceptions, of course—was not a great authority on street lighting. In such circumstances the electrical engineer, whether or not he had made a special study of street lighting, had to do what he was told by some other Committee. This militated against good street lighting. In Maidstone they had some very difficult street lighting problems to solve, as the main street was part of one of the arterial roads out from London. Difficulties were encountered by users of the roads because the High Street was well lighted and the portion of the road at either end, which was still the main road, was not so well lighted, so that people coming from the badly lighted part on to the well lighted part were inconvenienced, and *vice versa*. He himself had experienced this, as a motorist. As to the use of time switches, where boys were employed, as in Maidstone, he did not think there was sufficient saving to justify the installation of time switches. The charge for energy for street lighting at Maidstone had to be 5 per cent. above cost and the figure last year was 1.2d. per kWh, there being 750 electric lamps, and 120 gas lamps mostly on the outskirts. Those who were using the directional type of fitting might like to know that trouble was experienced at Maidstone, at first through corrosion of the silvering, but the manufacturers now seemed to have got over that trouble.

Mr. E. S. SHARP (Venner Time Switches, Ltd.), said the time switch did not seem to have many friends at the meeting, for the author did not speak well of them nor did Mr. Hoadley. A good deal turned on the life of the time switch, and although five years was the period in which their cost had to be paid off, they, in fact, had a very much longer life. Even taking the savings quoted in the paper of 14s. 6d. per year, the cost would be paid off in 4½ years. Within his knowledge, however, time switches had been in use for 19 years and were still functioning well.

Mr. W. E. BUSH (E.L.M.A.), said the paper was a veritable text book on street lighting, and he agreed with 90 per cent. of it. He wished, however, to correct a wrong impression

which the author apparently had in regard to the specification for electric lamps. The paper stated that if the specification was used, the engineer would probably only be within 50 per cent. of the calculated results because of the wide variation of tolerances which was allowed. Mr. Harrison had evidently taken, first of all, the rated wattage and the tolerance allowed, and then he had taken the efficiency in terms of lumens per watt and the tolerance allowed again, and by adding them together arrived at the figure of 50 per cent., whereas, as a matter of fact, the specification, although it allowed tolerances on both watts and efficiency, distinctly limited it to the over-all efficiency. In other words we could have one or the other, but not both. As a matter of fact it was possible to come within 12 per cent. of the mean as given in the specification, and he did not think this was unimportant to call attention to. Engineers were sometimes inclined to be a little critical as to the tolerances allowed and to think that lamps ought to be made much closer to the mean, but it should be emphasised that electric lamp materials were very much finer than those used in engineering.

Mr. L. GASTER pleaded for better street lighting from the "Safety First" point of view and suggested that if the mayors of our various towns were made responsible for street accidents, there would be an improvement. He also suggested that public inquiries should be held into street accidents as a means of bringing home to the public the importance of the whole problem of street traffic and street lighting.

Mr. E. G. BATT (General Electric Co., Ltd.), asked whether Mr. Harrison was in favour of series lighting. As to the Croydon type of fitting, he would like to know whether it had been possible to obviate the trouble due to loss of efficiency from deterioration of the surface of the reflecting materials used in this type of fitting.

Mr. HARRISON, who had no time to reply fully, referred only to the last point raised, and said that there was no reason to suppose that a silvered reflector would deteriorate if properly made, because the reflectors on the searchlights in the Navy were in operation throughout the whole period of the war and showed a deterioration of less than 3 per cent. at the end, although they had been working at a temperature two or three times that which was possible in any electric lamp fitting. It was all a question of having the silvering done properly and if an attempt were made to keep down the cost of the silvering unduly, then good results could not be expected.

Women in Council.

AT the special meeting for women on Tuesday, June 16th, at which Mrs. W. C. P. Tapper presided, a paper on "The Education of Young Women in Electric Cooking" was read by Alderman (Mrs.) S. E. Hammer. After pointing out the merits of the electric cooker, the author observed that it was still unknown to the majority of women, or regarded erroneously as only an experiment, and expensive at that. In the evolution of domestic electricity the hour had come for women themselves to take the field; an Electrical Association for Women (E.A.W.) had been formed for the promotion of the wider use of electricity in the service of women. The young women—the potential home makers—should be educated in electric cooking in the centres at which they were taught domestic subjects—in cookery centres, secondary schools and the polytechnics.

As the result of inquiries it had been found that several undertakings and educational authorities had already installed cookers in their cookery centres, and others were already discussing the advisability of so doing. The results obtained showed that the experiment had been highly successful. At Brighton for the past ten years an electric cooking equipment had been in use in the Technical College under the cookery demonstrator. Electric cooking provided a new career for girls; demonstrators' jobs were waiting for them wherever undertakings gave service as well as supplying current.

The author suggested, as the result of visits to training centres, that the cooker or other apparatus supplied should be of the very latest type and that competent advice and supervision should be provided, to ensure that the best possible results were obtained. Lady superintendents of domestic training centres should be kept up to date electrically, and the terms should be as easy as possible in these centres. It would even pay undertakings (as one had already discovered) to provide everything free of cost to the Education Committee, for this was a new field for electrical education and publicity. If every woman present would find out for herself the service of electricity to women and then hand on the information, and insist on the teaching of this in schools, electric cookers would soon be the necessity—not the luxury—of polytechnics and schools of cookery.

Mrs. H. A. Howie read a paper on "Electricity and Health," and charged the coal fire—the kitchen range being the prime offender—with the pollution of the atmosphere, even more than the industrial chimney. Sunlight was now recognised as essential to the upkeep of health and the cure of disease. To reduce the ravages of rickets and tuberculosis, which were rife in our industrial districts, they must look first to the abatement of the smoke nuisance. The material damage to buildings in Manchester alone amounted to one million sterling yearly, and the damage done to health was even greater.

They had probably to live with the coal fire in sitting-rooms for some time yet, but the kitchen range was quite another matter. Any electrical or gas apparatus which put the coal range out of action was a big smoke reducer. Immense strides had been made during the past few years in perfecting the electric cooker, and there were on the market cookers which were a pleasure to use, the oven and grill, particularly, having a very high efficiency. The electric hotplate had recently been immensely improved, and now left little to be desired. The hot water problem now seemed to be fairly on its way to solution. It was absolutely necessary to health and happiness that an abundant supply of hot water should be available at any time of the day or night, not only for baths and domestic uses, but also in case of sudden illness. The author had an immersion heater connected with the existing hot-water pipes from the range, whereby the temperature of the water could be regulated by means of a switch. This immersion heater had been in regular use had given excellent results, and had proved quite reliable, enabling the kitchen fire to be dispensed with during the summer months. The problem of all-electric water heating was largely one of cost, and there were hopeful signs that the solution of this difficulty was not far off.

In the meantime, it would be found convenient and economical in the ordinary household to provide hot water on a system fired by a coke or anthracite boiler. If additional heat was needed it could be obtained by fitting the storage tank with immersion heaters controlled by hand, or by a thermostat. Even where there was no coke or anthracite boiler, this heat-storage tank system was quite a practical proposition, for the cost was low; it heated up a large quantity of water, as for baths, over a lengthy period of time, and so took only a small quantity of electricity per hour. This system was advantageous to the supply authorities, for it filled up the station load curves and so tempted them to offer low prices. For ordinary household use the electric kettle was the most economical of all methods of heating moderate quantities of water, given a reasonable rate, *e.g.*, 1½d. to 1d. per unit, or under. One unit of electricity in one hour would boil two gallons of water from ordinary tap temperature. Two gallons heated up in ten hours would again take approximately one unit at the rate of one-tenth of a unit per hour. Another type of hot-water apparatus called the geyser, in which the water was heated quickly and the loading was necessarily high, was useful for hand-basin washing, dentists' and chemists' use.

A more general use of electricity spelt labour-saving and health in capital letters, and it was incumbent on all women who knew by practical experience the benefits to health and happiness which accrued from an extended use of electricity, to spread the good tidings in every way possible. It was by the education of women, by getting the housewife to realise that the future prosperity and increased success in the domestic use of electricity depended very largely upon the women, that they would influence public opinion.

"Electricity in the Home" was the subject of a paper by Mrs. T. A. Kingham, who gave some facts which she had experienced in connection with the purchasing of apparatus and the use thereof, to enable the manufacturer to consider his household appliances from a woman's point of view. If electricity was to become the popular necessity it was made out to be, something must be done by the station engineers and contractors to standardise not only the various grades of utensils but the household fittings necessary for their use. All plugs and sockets of the same capacity should be of a standard size and interchangeable, and no others should be used. This standardisation should be applied generally to all apparatus, so that with kettles, toasters, coffee percolators, &c., for table use one need only have one flexible cable for use with each in turn instead of an independent one for each article.

Sockets on the skirting boards should have a switch next them or else the metal portion well down inside the china, so that there would be no danger to children when crawling around and putting their fingers into everything. Why did it always seem necessary to fix these plugs low down on the skirting board? Why could they not be fixed on the wall in about the same position as the usual bell push, which would be more convenient and obviate so much bending about?

As regards the supply authorities, why could not they install a cable to each private house of sufficient size to meet the average requirements? All over the country intensive campaigns had been in progress to convert our folk to electric cooking, &c., and in the majority of cases, where converts had been made, it was discovered that the apparatus could not be installed until a new cable was put in from the street. In many cases this caused great inconvenience and disgust and in some cases, refusal to proceed further.

Installation Policy: Its Importance to the Electricity Supply Industry.

By L. L. ROBINSON, M.Inst.C.E., M.I.E.E, M.I.Mech.E.

(Abstract.)

THE author wishes, at the outset, to explain that this Paper is not written with the object of damning electrical contractors whether good, bad, or indifferent. It is not proposed to deal with the technique of wiring and installation work, but rather to deal with the subject as it appears to the author to affect the proper development of the electricity supply industry. The objective of municipal electrical suppliers is to give a perfect service of electric lighting, heating, power, cooking, &c., at minimum cost, always provided that it is not given at a loss which non-consuming ratepayers would have to make good.

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The primary object of a wiring contractor is to make a profit, and it is only human that he should strive to sell that which will sell most easily and make the greatest possible profit, whether the very best service is given to the consumer or not. Unwarrantable injustice must not be done to existing interests so far as this can reasonably be avoided, but it would be much better if new, and often irresponsible firms, professing and calling themselves electrical engineers, were not always springing into existence. There need be no pity for these "curbstoners" as the Americans so tersely describe them. It is rather difficult to suggest what should be done with the existing genuine contractor. Probably he does not require the author's sympathy, because experience proves that the good contractor can always get plenty of work in spite of the electricity supplier's competition in installation work. In fact, the general good impression created by a strenuous well-advertised undertaking makes more work for all, the general flow of business being so greatly increased by the undertaking's generous publicity that good competing contractors, who keep pace with the standards of service set by the undertaking, benefit rather than lose by the competition. Electricity supply undertakings should be fully equipped with:—

(*a*) A reliable staff of experts, competent to demonstrate and to advise consumers on the best way to use electricity for all purposes, and to advise manufacturers upon improvements in the design of apparatus based on large scale practical experience.

(*b*) Sufficient efficient supervision to see that the ideas of the experts are properly carried out.

(*c*) A competent staff of reliable workmen capable of tackling efficiently any kind of installation, and especially maintenance, work likely to be wanted in the area.

(*d*) Last, but not least, a good sales manager with general engineering knowledge preferred, but above all with strong personality and good business ability, to control under the general manager the whole of the sales side of the electricity supply business.

It appears to the author that while some means must be found of getting more direct control of the wiring and installation work so as to ensure that the consumer gets proper advice, the best way in the end will be found by working to a great extent with and through good contractors rather than against them. Such combined effort should produce a good service and may eventually crush out the "curbstoners" and little-minded men who are no good to the industry. This would be done by associating only with registered electrical installation contractors, especially with those who are known to boost the supply undertakings, and severely boycotting those, fortunately very few, who speak, advertise and write against it, thinking stupidly that by so doing they are boosting themselves. It is to be hoped that the registration authority will be very careful about re-registration, so that weeding out if necessary may be effective. It is not so easy to work through even the best of contractors as it is to work direct. You cannot send half a dozen contractors to survey a small house and quote for installation. There must be a kind of "give and take" arrangement to cover all cases. The undertaking might select with the help of the E.C.A. according to the size of the area a certain number of contractors with whom it would place orders for a period. These should be called to a conference to discuss the general draft specification which the engineer would have already drawn up to cover all the routine installation requirements of his area; a day work schedule, and the schedule prices at which any and all of the contractors would be prepared to work, would be filled in by the conference. As the undertaking is presumed to have a nucleus wiring staff, and experience of costs, the prices can readily be set from the cost sheets, allowing a reasonable profit, remembering that the contractor is saved selling costs and bad debts. The undertaking's profit must be added to cover handling the business made up of selling costs, liability for bad debts, and administration. There should be no difficulty in meeting periodically to revise the schedules in the light of experience, so that all sides feel they have a square deal and work as an "Electrical Team." But the contractor must be satisfied with a smaller and more certain return on work obtained without much trouble. Then the work would be given out by the sales manager in rotation, so as to keep all contractors fairly equally employed. As any contractor who did bad work, failed in etiquette or *esprit de corps*, or failed to behave decently in any other way, would be dropped off the rota, it seems reasonable to expect that all the decent local contractors in a short time would be working contentedly with and through the undertaking. Alternatively, if they failed to work with the undertaking they would have no grounds left to complain of the undertaking's competition.

Part of the scheme would be that the undertaking would maintain a fine central show room and each contractor working with the undertaking would be expected to keep a decent shop and a good stock of wiring materials. Contractors could sell fittings from the undertaking's showroom, sharing the profit so that a small portion would go to the upkeep of the main showroom. Associated contractors would be expected to meet the undertaking's sale staff frequently in conference to keep up-to-date with the undertaking's tariffs and selling schemes and to keep closely in touch with all the affairs connected with the undertaking's sales organisation. In effect, they would become co-workers with the undertaking. Their advice could be used largely in determining selling policy, scale of charges for energy, and many other things for the good of electricity. Thus the contractors' position in the industry could be established on a more useful, and above all things, a more friendly basis, while the undertakings would maintain all possible points of contact with the public and better control over the great electricity service to the public. There are two things left for the undertakings to do which it is almost impossible to arrange by contract. They are:—

Special installations involving new ideas which cannot be covered in general contracts and are best carried out under personal supervision.

Urgent maintenance service, because an urgent service through a third party is difficult to organise quickly enough.

For these the author recommends that a special staff of very reliable men should be maintained by the undertaking. The author thinks that in the end the E.C.A. will realise that it will be of advantage to it for all suppliers of electricity to have selling powers. They have hiring powers, but this is no good. Sooner or later hires turn into sales. With the support of the E.C.A. there should be little difficulty about the matter. What are the greatest obstacles to the more rapid displacement of old methods in favour of electrification? In the author's opinion they are:—

The first cost of installation.

The reluctance of tenants to improve landlords' property at their own cost.

It is a startling fact that wiring for 40-watt points to-day costs about £25 per kW installed; it is greater than the installation cost of a modern power station. Instead of making installations more and more costly by tightening up wiring regulations in face of the fact that shocks and fires are remarkably infrequent, everything possible should be done to simplify and cheapen the work without making installations less safe than they are to-day. The author is looking forward to the day when a six, eight or ten-room wiring set will be bought over the counter in a packet with a simple diagram, so that any amateur who can run a wireless set can fix his own installation and make a hobby of it just as he does with his wireless set to-day. More than half the cost of installation is labour and overhead charges, and labour at that of the simplest nature not beyond the intelligence of quite ordinary mortals.

To make such a scheme popular it would have to be run in connection with a newspaper, such as "Wiring and Wireless"—perhaps Mr. Scott Taggart will take the hint. When dealing with well-to-do clients, there is not much difficulty in getting cash for an installation, because to a man living in his own house, with his own repairs and decorations to do, electrification throughout and complete for all purposes is better than a 10 per cent. investment. In the next stage down the social scale, where £20 in a lump is a serious consideration, the house-owning consumer can often be tempted by hire-purchase or instalment terms. Lower still it is surprising what a high price per unit is willingly paid by those who would not lay out £5 in an installation. For these a free-wired prepayment meter system, with or without minimum guarantee, is essential to progress. This system also will get the man who lives in someone else's house, because he does not feel that he is doing the landlord any good, although, of course, he is, and landlords with a few exceptions are willing to sign agreements protecting the undertaker's installation. All such agreements should include optional purchase clauses which are frequently exercised at some time or other by the tenant or landlord, after which ordinary instead of prepayment meter rates are charged. For a new application like cooking, the author prefers pure hire terms. It is realised that in cookers improvement in design, which could never be made until large scale operations were commenced, is now very rapid. It would be unfortunate to spoil the business by leaving obsolete cookers on the hands of consumers who had bought them. By hiring, the undertaker keeps control of the cookers, learns all about defects and how to overcome them, and how to suggest improvements in design to the manufacturers. The cost of keeping up to date is bound to be heavy for a few years yet, but anyone who has vision as to the value of the cooking load will not grudge this initial expenditure. Contractors alone have not proved themselves capable of running deferred payment or hire schemes. Therefore all this work must be done by the undertaking, or in some such way as has been outlined above. Otherwise the output due to such schemes must be left in the hands of our rival's supply for at least another generation.

(*To be concluded.*)

Electricity and Prosperity.—Speaking at the launch at Sunderland of a new collier for the Gas, Light and Coke Company recently, Mr. D. Milne Watson, governor of the company, said that it was said that if the Government would only start an electricity scheme and link up super-stations throughout the country, the country would be put on its legs again, unemployment would disappear, and trade would boom. Given a fair field, he said, the gas undertakings were prepared to meet electricity without fear. They could not believe that a big Government electricity scheme would achieve the object aimed at. The North-East Coast had probably the most efficient electricity service in the country. The costs were very low—as low as they were in Chicago. Yet the North-East Coast was plunged into the deepest depression, whereas Chicago was flourishing. Therefore, electricity did not seem to be the means by which a revival of trade would be brought about.

Business Notes.

The "Electrical Review" Competition.—In our last issue we published a first announcement regarding the competition that will next week be open to advertisers (and their representatives) whose advertisements appear in the pages of this journal during the coming six months.

To-day we are in a position to give the names of the three gentlemen who have kindly consented to act as judges. We feel sure that the selection of Messrs. J. W. Beauchamp, L. G. Tate, and L. L. Robinson will inspire confidence on the part of competitors. Mr. Beauchamp is Director of the British Electrical Development Association, so that in addition to his having had wide experience in the past as a purchaser of electrical manufactures required by public electricity undertakings, he now has charge of the most enterprising electrical business-getting organisation in Great Britain, an Association which is responsible for a very big annual output of electrical publicity literature designed to reach the eye and mind of the public. Mr. Leonard Tate, as a representative of the installation contracting industry which consumes a large part of the product of our manufacturers of electrical materials, and as the secretary of the Incorporated Electrical Contractors' Association, readily understands the merits of notices prepared for appealing to that class of buyer. Mr. Robinson, the borough electrical engineer of Hackney, is well-known to the industry as a man who is anxious for originality and personality to have free expression in assisting the full development of electrical applications. All three gentlemen possess the essential qualification of independence of particular manufacturing interests, and they are men of sound and reliable judgment.

We reproduce the full particulars on p. xlviii of our advertisement section this week. It may be repeated here that the judges will give special thought to the following points:—Power of immediate attraction; qualities compelling continued attention; boldness of design; and artistic arrangement.

We may repeat that it is with a view to assisting advertisers in their efforts to secure the best results from their advertisements appearing in the ELECTRICAL REVIEW that we have decided to offer three prizes of substantial value (£100, £50 and £25) to companies, firms, or representatives thereof, responsible for the best series of six full-page, half-page, and quarter-page advertisements published in this REVIEW during the next six months.

We hope that there will be an enthusiastic contest and invite those interested to fill in the necessary forms and forward them to the ELECTRICAL REVIEW, LTD., 4, Ludgate Hill, E.C.4.

The Proposed Labour Alliance.—On June 16th, the committee appointed by the trade unions covering the mining, railway, engineering, and transport industries to consider the question of an "alliance" between these unions held its first meeting. It was reported that the committee confined its attention to a general discussion of the matter. It was also stated that the Electrical Trades Union had applied for representation on the committee.

Motor-car Depreciation Allowance. — Mr. W. R. Fairbrother, writing from 67, Cheapside, E.C., says:—"The announcement that the Government intend to insert in the Finance Bill a clause enabling depreciation and/or obsolescence to be given in respect of plant and machinery, will prove most welcome to persons assessed in respect of professions or vocations. It has for too long been the law that such depreciation could be deducted in the case of a trade or business only, and the Royal Commission recommended so long ago as 1920 that the allowance should no longer be restricted to traders. Now that it is proposed to extend the principle to professional men, the difficulty of securing an equitable allowance in respect of motor cars will disappear."

The Royal Agricultural Show.—At the Royal Agricultural Show, which is to be held at Chester from July 7th to 11th, the Chester Corporation will have an exhibit demonstrating the application of electricity to farming and domestic purposes. The Corporation is also providing electric power free of charge to exhibitors who require it. Among the exhibitors will be Messrs. Ruston & Hornsby, Ltd., who intend to show several examples of their petrol, oil, and steam engines, as well as such agricultural machinery as ploughs, binders, thrashers, and pumping plant. The engines will include two or three patterns suitable for driving electric generators.

Trade Announcements.—MESSRS. NATHAN & ALLEN, LTD., who heretofore have managed the Wardle Engineering Co.'s London office, are relinquishing the agency in favour of Mr. H. Gunner, who has been a member of their staff for many years, and to whom, from July 1st, communications from the Euston area should be addressed at 346, Strand, W.C.2. Telephone: Central 4705.

In order to handle the increasing demand for "Inventum" electrical appliances, an independent Sales Department for the Home and export trade has been established, and from Monday next all communications should be addressed to Mr. ALAN WRIGHT, Sentinel House Southampton Row, London, W.C.1. Telephone No.: "Museum 7560."

The organisation for service in connection with "Rotax" lighting and starting equipment has been added to by the appointment of Messrs. NIBBS & SCOTT, 24, Great Southsea Street, Southsea.

MESSRS. W. J. CORSE & Co., Station Road, Plymouth, have purchased the entire stock of Messrs. Roberts & Co., electrical engineers, of Old Town Street.

THE STELLA CONDUIT CO., LTD., has appointed Messrs. J. G. Ellis & Co., of Western Mail Chambers, Cardiff, to represent it in South Wales.

MESSRS. ESCHER WYSS & Co., S.A., announce that, for the convenience of their clientèle in Scotland and the North of England, they have opened offices at 74, Bath Street, Glasgow, C2.

In connection with its sales-expansion policy, the LONDON ELECTRIC WIRE COMPANY & SMITHS, LTD., is opening an office and warehouse at 164, Corporation Street, Birmingham, which will be in charge of Mr. H. B. Hocken. A stock of "Lewcos" products will be carried at the new branch, facilitating service in the Midlands.

MESSRS. J. BRIDGE & SON, wireless engineers, of 300, London Road, Westcliff, have opened a new branch business in Warrior Square, Southend-on-Sea.

An Electrical Fittings Trade Amalgamation.—An event of more than ordinary interest to the electrical trade, and one connecting two names which have long been well known in the industry, Osler and Faraday, has to be placed on record. The business of F. & C. Osler, Ltd. (100, Oxford Street), was founded as long ago as 1807, and it has stood for many years in the front rank of the electrical fittings and glassware trades. With a view to further developing the electrical branch Messrs. Osler have discontinued the retail sale of china and glass, and we have no doubt that this point will interest electrical contractors and traders who have concluded from the possession of a large retail shop that that section of their business was more considerable than it really was. In connection with this development it will be known already to some of our readers that the ancient house of Osler has been operating jointly for several years with the nearly as ancient business of Faraday & Son, Ltd. (started in 1814), of 150 Wardour Street. The coming together of the two concerns was begun in 1918, characteristic tendencies of the two firms being preserved and the works kept apart on the traditional sites which had been so long occupied. The relationship, however, now becomes a closer and more intimate one of actual amalgamation under the name of Osler & Faraday, Ltd. The enterprise of the business has in recent times taken the form of the opening of branches at Manchester (5, Deansgate), and at Belfast (Queen's Buildings, Royal Avenue), while in July one will be opened at West Regent Street, Glasgow. These branches are for the convenience of the purely wholesale trade in glass and metal electrical fittings. The company will shortly be engaged on an extensive rebuilding scheme in London, and when this is completed the two amalgamated businesses will be housed under one roof instead of in two separate places, and they will operate under the new joint title of Osler and Faraday, Ltd. The combination is designed to meet the needs of the electrical trade covering all kinds of electrical fittings in the finest English cut crystal glass, brass, bronze, and iron.

Bankruptcy Proceedings.—EMANUEL SHULMAN, dealer in electric lamps and accessories, 103, New Road, Whitechapel.—At the London Bankruptcy Court on June 16th, before Mr. Registrar Mellor, this bankrupt applied for an order of discharge from bankruptcy proceedings instituted against him last October on the petition of the British Thomson-Houston Co., Ltd. The Official Receiver (Mr. V. Armstrong) reported that the bankrupt returned liabilities of £472 and no assets whatever. In February, 1923, the petitioning creditors issued a writ against the bankrupt for infringement of their patent, No. 10,918, and obtained an injunction restraining him from infringing it, with costs, which he had not paid. In the following April the petitioning creditors obtained a similar judgment in respect of their patent, No. 23,499, and the bankrupt's business was then taken over by the Central Electric Engineers, Ltd., of which the only shareholders were his wife and his daughter. His Honour, in giving judgment, said the bankrupt, who came here from Russia in 1895 and had not been naturalised, appeared to be not only a rogue, as he had been described in the High Court, but a professional infringer of patents. The offences of insufficiency of assets to equal 10s. in the £ on the amount of the liabilities; of omission to keep proper books of account; and of failing to account satisfactorily for the deficiency of assets to meet the liabilities had been reported by the Official Receiver and his report was fully justified. The bankrupt had deliberately placed his assets out of the reach of his creditors. It was obvious that the bankrupt was a most undesirable man to be allowed to remain in this country, and although he (the Registrar) could not order his deportation, he could prevent him from entering into business for some time, and the discharge would be suspended for five years.

SUBURBAN ELECTRICAL & MAINTENANCE Co. (S. C. Rapson, C. L. Burrill, and A. J. Heffer), electricians, 2, Plough Yard, Shoreditch, E.—The first meeting of creditors under this failure, in which the receiving order was made on the petition of the debtors, was held last week at the London Bankruptcy Court. The Official Receiver reported that it appeared from statements made by the debtor Rapson that he was apprenticed to the electrical trade, and until the year 1911 he was in employment. He commenced business in 1911 as an electrical engineer with a capital of £100. At the outbreak of the war, however, he was called up for service. He was demobilised in the year 1918, when he obtained employment at his trade, and he remained so engaged until March, 1922. He then entered into partnership with the debtor Burrill, and they began business as electricians in High Street, Poplar, under the style of the Suburban Electrical & Maintenance Co. They borrowed for capital a sum of £300, which was still owing. In June, 1922, they were joined in partnership by the debtor Heffer, who brought in as capital a sum of £100, and was given an equal share in the profits of the business. The business was fairly successful until last November, when they took on a Government contract for re-wiring part of Somerset House, at a cost of £2,450. The contract involved them in an expenditure of £3,400, and a considerable portion of their trade debts related to it. At the date of the receiving order, the firm was engaged on three jobs, which, in his opinion, would have taken another £100 to complete, when a sum of £80 would have become available for creditors. In the middle of last month a private meeting of the creditors was held, and, with one exception, they agreed to accept a composition of 7s. in the £, on condition that cash creditors withdrew claims totalling £500. To this suggestion these cash creditors agreed, but one of the other creditors would not entertain the composition, which accordingly fell through. The debtors were thereupon advised to file their petition, and this they did. The debtor Rapson attributed the failure of the firm to losses on contracts and bad debts. He estimated the firm's liabilities at £2,700. The assets appeared to be of a substantial amount, and the meeting passed a resolution for the appointment of Mr. W. A. J. Osborne, accountant, Balfour House, Finsbury Pavement, E.C., as trustee to administer the estate under an order of adjudication which had already been made by the Court. A committee of inspection was also appointed.

M. H. TATE, electrical agent, 149, Fenchurch Street, E.C.—The public examination of this debtor was held last week at the London Bankruptcy Court, before Mr. Registrar Mellor, the accounts showing total liabilities of £731 (unsecured £491), and net assets valued at £127. In the course of his evidence the debtor stated that in January, 1923, he commenced business as an engineer, and, being without capital, he was financed by a firm of electrical contractors, for whom he acted as London agent, until the following June, when the agency came to an end. He attributed his failure to depression in trade, lack of capital, and to litigation in which he was unsuccessful. The examination was concluded.

The following are creditors:—

	£		£
Fryers, Ltd.	117	Hoffman Mfg. Co., Ltd.	23
Hart Accumulator Co., Ltd. ...	189	Watkins & Stone	28

F. H. P. HOOLAHAN (trading as Holloway Bros.), electrical engineer and instrument maker, 299, Holloway Road, N.—This bankrupt, who failed in August, 1924, applied on June 12th at the London Bankruptcy Court for an order of discharge. The Official Receiver reported that the applicant commenced the business in January, 1921, with £30 capital and failed with liabilities of £251 against assets that had realised £33. Lack of capital, losses on experimental work, foreign competition, and general trade slackness were the reasons assigned for the failure. The discharge was granted subject to judgment for 30s. to be satisfied by an immediate cash payment.

JOHN WORSLEY, Hollin Cottage, Darwen, electrician.—The examination of this debtor was closed at the Blackburn Bankruptcy Court on June 17th. Debtor said he was entitled to a fifth share under his mother's marriage settlement, and from the estate he had received £322. Since the last hearing he had met the beneficiaries under the settlement and they had agreed on an account, which showed that £70 was due from him to the estate. He had filed an amended deficiency account showing his deficiency as £230, in which was included "loss incurred by the default of an employee, £40."

F. A. FRASER, electrical engineer, Sanctuary House, 33, Tothill Street, Westminster, S.W.—First meeting, June 26th. Public examination, September 29th, both at Carey Street, W.C.

W. R. GRIGSBY (Wenham Lighting Corporation), electrical contractor, 124, Gray's Inn Road, W.C.—First meeting held June 23rd. Public examination, September 15th; both at Carey Street, W.C.

H. A. SANDERS, electrical contractor, Black Cat Restaurant, Chawston, Beds.—First meeting June 26th at the Official Receiver's office, The Parade, Northampton. Public examination, July 21st at the Shire Hall, Bedford.

THE C. C. S. TRADING Co., electricians, 30, Western Mail Chambers, Cardiff.—First meeting, June 26th at 34, Park Place, Cardiff. Public examination, July 15th at the Law Courts, Cardiff.

J. R. PATTISON, electrical supplies factor, 15, Goldsmith Street, Nottingham.—First meeting June 26th, at the Official Receiver's Offices, 4, Castle Place, Nottingham.—Public examination, July 2nd, at the County Court House, Nottingham.

A. W. MATTHEWS and F. G. MATTHEWS (Electrical, Gas and Engineering Co.), electrical, gas and engineering contractors, 130, Main Road, Handsworth, Sheffield.—First and final dividend of 4s. 2½d. in the £, payable June 22nd, at the Official Receiver's Office, 14, Fig Tree Lane, Sheffield.

J. E. CRACKNELL, photographer and wireless supplies dealer, High Street, Manningtree.—First meeting held June 23rd at 9, Arcade Street, Ipswich. Public examination held June 24th at the Law Courts, Colchester.

C. B. MAURICE, cable supplier, late of Windsor House, Victoria Street, S.W.—Receiving order made June 17th, on creditor's petition.

J. HUMPHREYS, plumber and electrician, The Yard, behind the Plough Inn, Oldham Road, Rochdale.—Receiving order made June 16th, on debtor's own petition.

A. T. K. MOIR (Moir & Watts), electrical and mechanical engineer, Weardale Road, Lee, Kent.—Trustee, Mr. F. H. Hawkins, 4, Charterhouse Square, E.C., appointed June 16th.

D. C. BATE, electrical manufacturer and supplier, 16, John Dalton Street, Manchester.—Last day for proofs for dividend July 4th. Trustee, Mr. J. F. Warburton, 28, Queen Street, Manchester.

F. S. BOWEN (Manchester Electrical Maintenance Co. and F. Bowen & Co.), electrical engineer, 7, Brazennose Street, and 43, Thomas Street, Manchester.—Last day for proofs for dividend, July 4th. Trustee, Mr. R. R. Smethurst, 21, Spring Gardens, Manchester.

J. B. SHIELDS, plumber and electrician, 221 & 198d, Linthorpe Road, Middlesbrough.—Last day for proofs for dividend, July 8th. Trustee, Mr. C. P. Barrowcliff, 53-57, Albert Road, Middlesbrough.

J. F. LYONS, electrical engineer, 25, Palmerston Street, and Front Street, Cousett.—Last day for proofs for dividend, July 3rd. Trustee, Mr. C. Woollett, Official Receiver, Pearl Buildings, 4, Northumberland Street, Newcastle-on-Tyne.

G. H. DIXON, electrical contractor, 46, Market Street, Dewsbury.—First and final dividend of 5½d. in the £, payable June 26th, at the Official Receiver's Office, 12, Duke Street, Bradford.

Company Liquidations.—MARINE AND MECHANICAL ELECTRIC WELDING Co., LTD.—Winding up voluntarily. Liquidator, Mr. L. C. Fisher Robson, 146, Bishopsgate, E.C.2. A meeting of creditors was called for June 24th at the liquidator's offices.

SPARKES ELECTRICAL Co., LTD., electrical and radio dealers, 115, Hammersmith Road, W.14.—A meeting of the creditors of the above was held on June 17th at the offices of Mr. E. W. Viney, C.A., 11, Queen Victoria Street, E.C. The shareholders had previously passed a resolution in favour of voluntary liquidation, and had appointed Mr. Viney to act as liquidator. According to the statement of affairs prepared, the liabilities totalled £443, being made up as follows:—Preferential claims, £39; unsecured creditors, £104; and cash creditors, £300. The assets were estimated to realise only £30. The company was formed with a nominal capital of £400 in £1 shares, and the issued capital was £293. No resolutions were passed, and the voluntary liquidation will therefore be continued with Mr. Viney as liquidator. The following are the principal creditors:—

	£		£
Briggs, A. L.	48	Briggs, A. H.	300

F. DARTON & Co., LTD., St. John's Street, E.C., makers of electrical apparatus, &c.—A meeting of the creditors of the above was held recently, at the offices of the liquidator, Mr. Kelvin C. Pollock, C.A., Balfour House, Finsbury Pavement, E.C. A statement of affairs was presented which disclosed liabilities of £4,302, all due to unsecured creditors. There was a contingent liability in respect of dilapidations, and in respect of a service agreement but no figures were given in that regard. The assets were expected to realise £1,400, from which had to be deducted £100 for preferential claims, leaving net assets of £1,300, or a deficiency as regarded the creditors of £3,002. The liquidator reported that the company was registered on May 27th, 1921, with a capital of £1,000, to purchase and take over an existing business founded as long ago as 1834. The purchases for the year 1924 amounted to £4,767, while the sales were £9,656. A gross profit of £3,000 was made, but there was a net loss of £475. The liquidator was asked why the stock had been written down from £7,000 to £700; he replied that a great quantity of it was pre-war stock and was consequently of very little use to the trade. He had been trying to dispose of the business for some weeks past, but had not received any offers. No offer was submitted, and after some discussion it was resolved to adjourn the meeting. At the adjourned meeting it was decided that Mr. Pollock should continue as liquidator and that Mr. Baker, representing creditors, and Mr. Gerasse, should act with him as a committee of inspection. The following are creditors:—

	£		£
Curtis & Beamish	114	Urashe —.	53
Darton, O. (Exors. of)	943	Bankers	365
Darton, F. A. (Exors. of) ...	1,241	Newbould & Co.	95
Gilbert, G.	107	Phillips & Co.	87
Heal, W.	79	Shaw, H., & Son	84
Jules Lang	83		

Dissolutions of Partnership.—MILLWARD, LANE & ASTLEY, engineers and electrical contractors, 177, Hockley Street, Birmingham.—Messrs. V. H. Millward, E. P. Lane, and J. W. Astley have dissolved partnership.

THISTLETHWAITE & EDGAR, electrical engineers, Back St. Annes Road West, Lytham St. Annes.—Mr. E. Thistlethwaite and Mr. J. Edgar have dissolved partnership. Mr. Thistlethwaite will attend to debts and continue the business under the same style.

Catalogues and Lists.—THE RAY MANUFACTURING CO., 350, Fishponds Road, Bristol.—Illustrated pamphlets dealing with the "Marshall" battery tester, and "Andy" fuse-wire wallets.

MESSRS. GENT & CO., LTD., Faraday Works, Leicester.—Pamphlet No. 89a, advertising the "Touchstone" electric horn.

MESSRS. T. HARDING CHURTON & CO., LTD., Atlas Works, Water Lane, Leeds.—Circulars Nos. 657 and 658, giving prices and particulars of slip-ring induction motors (crane type).

MESSRS. W. B. DICK & CO., LTD., 26, Grosvenor Gardens, S.W.1.—A booklet dealing with "safety first" driving and the scientific lubrication of automobiles.

DOWDING'S MACHINE TOOL CO., Bush House, Kingsway, W.C.2.—A "machine tool registry," containing particulars of new and second-hand machine tools.

MESSRS. J. A. CRABTREE & CO., LTD., Lincoln Works, Walsall.—List No. 1,041, illustrating a number of shock-proof tumbler switches. Priced.

MESSRS. MAVOR & COULSON, LTD., 47, Broad Street, Mile End, Glasgow.—A priced stock list of d.c. and a.c. motors.

THE VEE CEE DRY CELL CO., LTD., Queensway, Ponder's End, Middlesex.—A circular and a priced leaflet dealing with "Vee Cee" radio batteries.

METROPOLITAN-VICKERS ELECTRICAL CO., LTD., Trafford Park, Manchester.—Descriptive leaflet No. 703/1-1 dealing with the "Metrovick" conveyor oven for bread baking.

MARCONI'S WIRELESS TELEGRAPH CO., LTD., Marconi House, Strand, W.C.2.—Leaflet No. 1,050, describing the "Marconi" 500-W "Type U" transmitter.

MESSRS. PHILLIPS & TURNER, Cambridge Street, Birmingham.—A mailing card illustrating examples of the firm's electric lighting fittings.

BRITISH CENTRAL ELECTRIC CO., LTD., 6 and 8, Rosebery Avenue, E.C.1.—Two illustrated pamphlets advertising a shock-proof hand lamp, a three-pin hand-shielded plug, and "Koh-i-noor" adhesive tape.

NEOCELLON, LTD., Garratt Lane, Wandsworth.—A pamphlet describing "Neocellon" solutions for electrical purposes.

MESSRS. FERRANTI, LTD., Hollinwood, Lancs.—A leaflet illustrating an installation of one of the company's pole-type transformers for rural electrification.

New Municipal Showroom.—The Blackburn Corporation Electricity Department has recently established a showroom in which examples of the most modern electrical appliances are shown and demonstrated. Cooking is given particular attention and it is stated that this can be carried out at a

A Corner of the New Blackburn Showroom.

daily cost of 1½d. per person. The Borough Electrical Engineer has sent us a number of photographs of the showroom, and we reproduce one showing a complete kitchen equipment—cooker, water-boiler, food-mixer, and other electrical appliances.

British Radio Apparatus at Canadian Exhibition.—*British Industries*, the official organ of the F.B.I., says that difficulties in connection with patents last year prevented British radio firms from taking an active interest in the Canadian market, since apparently some uncertainty existed as to the extent to which devices were protected or came into conflict with inventions produced on the other side of the Atlantic. These difficulties have now been overcome, and the interest shown by radio manufacturers in the F.B.I. British Section which is to be organised this year at the Canadian National Exhibition, Toronto, is an indication of the value which they are finding in that market. The radio exhibits, while not occupying a large area, will be of considerable importance and will form one of the most interesting features of the Section.

French Concessions in Turkey.—The British Chamber of Commerce at Constantinope learns that the firm Bauer, Marchel et Cie. (late Périer et Cie.), of Paris, has obtained a concession for the establishment of an electric power station, which includes an electric tram service and the electric lighting of the town of Brussa. Grammont et Cie., another French firm, is also stated to be negotiating a similar project with the Samsun authorities. Tenders were not called for in either of these cases, but applications were made by the firms themselves.

Co-operative Societies and Electricity.—The Co-operative Wholesale Society, Ltd., of which Mr. R. L. Gass is the chief engineer at Manchester, has an engineering department which is now engaged on an electric light and power installation for the Morley Co-operative Society; the installation of electric lighting and power for the bakery of the Stafford Co-operative Society; the changing over of a weaving mill to electric drive; and lighting for the Nelson Co-operative Society. It is also engaged on electric lighting work for the co-operative societies at Warrington, Manchester, Ellesmere Port, Birkenhead, Droylsden, Grantham, and Rawtenstall.

For Sale.—By order of the liquidator, Mr. H. J. Shaw will sell by auction on July 7th, at 85, Newington Causeway, S.E., the stock of an electrical goods factor. The Crittall Manufacturing Co., Ltd., invites offers for three 120-kW Garrett d.c. sets, condensers, and auxiliaries. By order of the receiver for the debenture holders, Messrs. Henry Butcher & Co. invite offers for the purchase, as a going concern, of the old-established electrical engineering business of Messrs. Cutting Bros., Park Works, Stamford. The Scottish Co-operative Wholesale Society Engineering Department invites offers for surplus power plant. (See our advertisement pages to-day.)

Book Notices.—"The Transactions of the South African Institute of Electrical Engineers." Vol. XVI, Part 3, April, 1925. The Institute. Price 2s.

"*Journal* of the Institution of Electrical Engineers." Vol. LXIII, No. 342, June, 1925. London: E. & F. N. Spon, Ltd. Price, 10s. 6d.

"Universal Directory of Railway Officials, 1925." Pp. 103 + 425. London: The Directory Publishing Co., Ltd. Price, 20s. net.—This is the 31st edition of a directory which covers the railways of the world, giving very full details of the *personnel*, &c. The volume should be of assistance to engineering firms who have business with railways.

"Miscellaneous Publication of the United States Bureau of Standards," No. 63. Report of Board of Visitors to Bureau of Standards of the Department of Commerce for the Secretary of Commerce. Price 5 cents.—The report contains a description of the inner workings of the Bureau of Standards. Tribute is paid to the research, industrial and scientific, carried out by the Bureau.

"Manner der Technik ein biographisches Handbuch," by C. Matschoss. Berlin: Vdi-Verlag G.M.B.H. 28 marks.

"History of the Telephone and Telegraph in Uruguay, 1886-1925." By V. M. Berthold.

We have received a copy of the Anglo-American Year Book for 1925, which has now reached its thirteenth year. It is published by the American Chamber of Commerce in London, at Aldwych House, W.C.2, at the price of 15s. net. Among its other useful features is a list of members, together with the names of their representatives here. There is a Residential Directory section giving names and addresses of Americans resident in the British Isles, also a "Who's Who" section regarding Americans and Anglo-Americans in Great Britain and Ireland; and not the least useful part is the "Commercial Directory," from which it is possible to ascertain associations which exist between certain British and American businesses.

Employés as Shareholders.—The annual report of the Canadian General Electric Co. states that bonds of the company are held by over 22,000 of its employés, the average holding being $555.

Czecho-Slovakian Import Duties.—The *Board of Trade Journal* publishes a list of goods which may be imported into Czecho-Slovakia, until December 31st, at a reduced rate of duty obtained by applying a reduced coefficient of 4 to the basic rates. The list includes dynamos, electric motors and transformers (except motor engines, and starting, ignition and lighting equipment for automobiles); and electro-technical appliances (regulators, resistances and the like) not specially mentioned.

The International Electric Lamp Syndicate.—The International Electric Lamp Syndicate, comprising British, French, German, American, Dutch, Swiss, Austrian, and Hungarian concerns, met on June 18th at Budapest for a congress which was expected to last several days.—*Reuter* (Budapest).

The Geneva Radio, &c., Exhibition.—We have received further details of this exhibition, which is to be held at Geneva from September 9th to 20th, from the Secretary, 6, Boulevard du Théâtre, Geneva. This states that the radio exhibition will be divided into six sections dealing with transmitting devices, receiving apparatus, sources of energy, general equipment, commercial radio-telegraphy, and the literature of the subject. The kinematograph exhibition will also include a fair number of electrical devices.

Czecho-Slovakian Contract for American Firm.—*Commerce Reports* announces that the contract for the supply of the equipment for the broadcasting station which is being erected at Prague has been awarded by the Government to an American firm. Delivery is to be made within six months.

Electric Lamps for Portugal.—There is a large importation of electric lamps into Portugal as national production cannot yet meet the total demand. The principal supplier is Holland with 70 per cent. of the total, but there is a fairly ready sale for other makes. The current supplied by the united companies for lighting Lisbon is 220 V, and lamps of from 30 to 50 candle power are in chief request. The type principally sold has the Edison screw top. There were 54 tons of lamps imported in 1923, and 24 tons during the first six months of last year. The most careful packing is recommended in order to avoid damage during transit and disputes between seller and ultimate user. Liberal terms of payment amounting to 60 or 90 days are granted.

Social Events. — The Elliott Social Association held its annual garden fête and sports gala on June 13th, and about 900 members and friends attended. Among the company were Messrs. W. O. Smith (president of the Association), F. Hird, A. W. Atkyns, L.W. Smith, and R. O. Smith. There was a comprehensive sports programme, and a number of side shows and competitions. During the afternoon, the band of the British Legion played popular airs, and in the evening provided music for a dance.

The annual "outing" of the staff and employés of the Tunbridge Wells Electricity Department took place on June 17th, when they went by motor to Brighton, and after luncheon, at which the borough electrical engineer, (Mr. R. N. Torpy), and the chairman of the Electricity Committee (who were attending the I.M.E.A. Convention), were present, the party went on to Eastbourne for tea. Favoured with fine weather, the day was a brilliant success.

The Siemens Sports Club third annual sports and gala took place on June 20th. The event attracted a large attendance and the weather was favourable. A feature of the meeting was the large number of trophies (23) which were competed for. An excellent musical programme was provided by the Callender's Cable Works Silver Prize Band.

Wages in the Engineering Industry.—The latest letter of the Engineering and Allied Employers' Federation upon the subject of wages in the industry was considered by a meeting of trade union representatives on June 19th. This letter urged the unions to take a deeper view of the position in which the industry finds itself. After some discussion it was agreed to meet the employers again to hear their explanations of the letter.

"Melanoid."—This is the name of a new colloidal bituminous paint that is being introduced and commercially exploited by the Mond Tar By-Products Syndicate. "Melanoid" is intended as a metal preservative. Another brand—"Zulite"—is for wood.

The Italian Electrical Market.—In a review of Italian electrical wiring practice, *Commerce Reports* states that since the war price has been a deciding factor in the purchase of equipment, but it is believed that as prosperity becomes more general the demand for high-grade electrical fittings will increase. Tumbler and "snap" switches are almost unknown in Italy, those generally used being of the rotary type, with occasional push-button switches. Both screw and bayonet lampholders are employed, and special receptacles, generally of the bayonet type, are installed on walls for the attachment of appliances. The Edison screw-plug fuse is widely employed, but the American cartridge type and the British "thumb-grip" pattern are seldom installed.

Importation of Radio Apparatus into Norway.—The *Board of Trade Journal* states that under the recently-issued regulations radio apparatus may only be imported into Norway by authorised dealers in radio materials who have received a general licence from the Director of Telegraphs, or by other authorised dealers and private persons with a broadcasting certificate, to whom the Director grants a licence for each individual case. Imported apparatus must pay the fee which is fixed for the sale of such apparatus in Norway.

Electric Water Heating Encouraged. — In order to encourage the use of electricity for water heating, the Westminster Electric Supply Corporation, Ltd., has made a reduction of the existing charge in the rate for energy consumed by "Bastiaa" patent storage geysers, connected either to the lighting or power circuit. The geyser is left continuously in circuit and the connections are sealed by the company. For every 50 W of continuous rated capacity a reduction of 100 kWh per quarter is made from the meter reading, this being charged for at a rate of .833d. per kWh, against the special rate of 1d. charged hitherto. By this arrangement consumers with only a lighting circuit are able to have the advantages of a power supply for water heating at a low rate.

French Telephone Industry.—The Compagnie Francaise Thomson-Houston has converted its telephone department into a separate undertaking under the title of the Compagnie des Téléphones Thomson-Houston. A large share in the new company is said to have been taken by the International Telephone & Telegraph Corporation, one of whose associated companies recently secured an important concession in Spain.

Canadian Water-Power Dispute Settled.—It is reported that the appeal by the St. Maurice Power Co., Ltd., against a judgment affirming that the United Manufacturing Co. had vested rights in the St. Maurice River has been decided in favour of the appellants.

The Export Credits Department.—The Export Credits Department of the Department of Overseas Trade will remove on June 29th from 73, Basinghall Street, E.C.2, to fresh premises at 30-31 King Street, Cheapside, E.C.2. The present telephone number (London Wall 4713) and telegraphic address ("Exportcred") will remain unchanged.

Colombian Electrical Trade.—During the year 1923, the latest year for which figures are available, the United Kingdom supplied goods to the value of 2,346,693 pesos out of Colombia's total imports of 9,092,549 pesos. The total value of electrical appliances imported was 174,618 pesos, and of this the United Kingdom's share amounted to 42,440 pesos, and that of the United States to 53,095 pesos.

Appointment of a Sales Department Manager.—The Hackney Electricity Committee recommends the appointment of a manager for the sales department of the electricity undertaking at a salary of £608 per annum, and it is suggested that the Establishment and General Purposes Committee shall be authorised to interview six candidates for the position chosen by the borough electrical engineer, and select three for the Council's consideration.

Unemployment.—The Ministry of Labour announces that there was an increase of 43,890 in the number of wholly-unemployed persons during the week ended June 8th. The total at that date was 1,291,000. There was an increase of over 100,000 in the two weeks ended June 8th and a rise of 263,685 in the twelve months.

German Industry During May.—The Commercial Secretary at Berlin (Mr. J. W. F. Thelwall) has forwarded to the Department of Overseas Trade a review of the commercial and industrial situation in Germany during May, 1925, based on the reports of the Prussian Chambers of Commerce. This states that the situation generally remained without material change during May. Production remained about the same; the labour situation improved, but the crisis in the Ruhr mining industry was not overcome. There was a revival in building, and the favourable development in the potash, motor-car, and electrotechnical industries continued. The legislative work in connection with taxation and import duties progressed, and it may be anticipated that commerce and industry will be freed from some of their present burdens. The home orders for the electrotechnical industry continued on the same level as during April, and it seems probable that this industry has now reached the summit of its present boom, but the uncertainty as to the future makes the framing of a plan of production extremely difficult. Foreign orders were insignificant.

Export Credits for Greece.—The Athens correspondent of *The Times* says that sealed tenders for the proposed new scheme of electric lighting and traction in Athens, Piræus, and the surrounding neighbourhood were submitted to the Government on June 17th by a power, traction, and finance company and a syndicate of Greek banks, with whom it is collaborating. This scheme involves an expenditure of several millions sterling, and the British Government is applying the export credits scheme for the purpose.

Short Time at the Brush Works.—Over five hundred workmen were affected by notices given in the heavy machine and turbine shops of the Brush Electrical Engineering Works at Loughborough that short time—from 9 a.m. to 4 p.m.—would be worked on and after June 17th. The car and rolling stock departments, on the other hand, are stated to be busy.

District Joint Industrial Council.—At a meeting of the District Council (No. 2) for the Electricity Supply Industry (Yorkshire, &c.) held on June 10th, it was decided to place the Scunthorpe and Frodingham Urban District Council's undertaking in Section "B" of the schedule of rates.

Lighting and Power Notes.

Argentina.—BUENOS AIRES.—According to *Commerce Reports*, the Spanish-Argentine Electricity Co. is planning to build a power station of 500,000 kW capacity in the new port of Buenos Aires. Probably seven steam turbo-generator sets will be installed. Coal-burning boilers are to be used. The station will supply electricity to Buenos Aires for power and lighting purposes.

Australia.—COROWA (N.S.W.).—The municipality has adopted the recommendation of the Electric Supply Committee for the conversion of the local electricity supply from direct current to alternating current, at a cost of £12,000. The Victorian Electricity Commission has prepared plans and specifications.—*Tenders.*

Barnet.—PROPOSED PURCHASE OF UNDERTAKING.—The Urban District Council has appointed a sub-committee to consider the question of purchasing that portion of the undertaking of the North Metropolitan Electric Supply Co. which is within the Council's area.

Birkenhead.—ELECTRICITY SUPPLY.—The Town Council, on June 10th accepted the principle of entering into an agreement with the Liverpool Corporation for a bulk supply of electricity for seven years, but rejected the stipulation that Birkenhead should not install any additional plant or obtain electricity in bulk elsewhere during the period of the agreement. In its place a clause was substituted providing that the Corporations of Birkenhead and Liverpool should agree not to develop their plant except by mutual consent. If Birkenhead obtains the whole supply from Liverpool it will cost £51,215, while Wallasey's charge for a bulk supply is £54,839, which includes the sinking fund on mains and transformers. Under the proposed agreement Liverpool pays for the mains from Lister Drive to Bentinck Street, where the current will be metered, and will also supply transformers and switchgear at a cost of £37,000. If the Corporation obtained a supply from Wallasey it would have to spend £20,000 on mains and transformers, and would also have to bear any transmission loss, representing from 2½ to 5 per cent., between the two stations.

Canada.—TORONTO.—The fourteenth annual report upon the Toronto Hydro-Electric System covering the year 1924 records a total revenue of $8,476,672, as compared with $7,353,228 in the preceding year. Working expenditure amounted to $6,211,092 ($5,159,002), leaving a gross profit of $2,265,579 ($2,194,226). The contributions to interest, depreciation, taxes, sinking fund, &c., absorbed $2,147,656, leaving a net surplus of $51,923 ($132,056), which, as in previous years, was transferred to reserve for stabilisation of rates. The sales of electrical energy increased from 392,367,546 to 485,708,476 kWh. The connected load rose from 451,898 to 542,074 h.p., and the maximum supply demanded from 155,741 to 191,803 h.p. The extensions carried out during the year included the installation of two 1,000-kW rotary converters and twelve 1,000-kVA transformers at two sub-stations, two 5,000-kVA transformers at another sub-station, and 259,470 ft. of underground cable and 24,900 ft. of 13,200-V overhead cable.

Continental.—FRANCE.—As a result of the increasing demand for power in the Nantes district, the Soci'té Nantaise d'Eclairage et de Force par l'Electricit'é is having plans prepared for a second power station which is to be equipped with larger generators than those of the existing Chantenay station. Designed for an ultimate capacity of 80,000 h.p., the plant at the latter station now totals nearly 65,000 h.p.

BELGIUM.—At the recent annual meeting of the Compagnie Luxembourgeoise d'Electricit'é, the directors reported that they had secured the concession for the supply of electricity to 86 communes in the Province of Namur, and that another in respect of 24 communes in Luxemburg was on the point of being signed.

The Soci'té du Gaz et d'Electricité du Hainaut is establishing a new generating station at Farciennes. Two 9,000-kW sets are being installed, which will bring up the company's generating capacity to 85,100 kW divided between four stations.

SPAIN.—The Compania Union Electrica Madrilena is carrying out extensions at its various central stations to meet the demand in the Madrid district. At the Inzarredo station a new 1,500-kW set has been installed, and a further 2,000-kW set ordered; at the Norte station a 1,500-kW set has been added, and one of similar capacity is being erected at the Mediola station. Two new 10,000-h.p. turbo-generators have also been ordered for the company's steam-operated station. The company has now 385 miles of h.p. and about 188 miles of l.p. mains in operation.

SWITZERLAND.—The Swiss Government has recently authorised the Prusio Electric Power Co. of Poschiavo, to export, under certain conditions, electrical energy to Italy for distribution by the Società Lombarda per Distribuzione di Energia Elettrica, of Milan. A maximum of 650,000 kWh per day is to be supplied, with a limit of 45 million kWh during the first three months of each year. The new agreement, which takes the place of two previous ones, will run to the end of the year 1959.

Doncaster.—ELECTRICITY SUPPLY.—Under the scheme arranged by the borough electrical engineer (Mr. S. R. Windle), electricity supply in the borough is now being gradually developed on sub-station methods. A sum of approximately £47,000 is being expended—half on out-district sub-stations and half on various improvements and extensions. Sub-stations are to be erected at Holmes Market, Norborough Road, Wheatley Hills, Craithie Road, Belle Vue, Cross Street and at Balby and Waterdale.

Dover.—LOAN.—The Town Council has applied for sanction to a loan of £2,000 for mains extensions.

Hamilton.—HYDRO-ELECTRIC SCHEME.—In connection with the proposal to install hydro-electric plant on the banks of the Clyde, a letter has been received by the Council from Messrs. Landale, Frew, Gemmell & Arnott, engineers reporting upon the mineral workings in the vicinity. They suggest that the proposals for the scheme need not be deferred, provided the engineer takes reasonable precautions in carrying out the work. The Electric Lighting Committee is to ascertain the probable cost of the scheme.

India.—MANDI SCHEME.—It is believed that preliminary construction on the Mandi hydro-electric scheme will be started some time this year. The whole project, when completed, should supply electrical energy to a vast area of the Punjab, including some 62 towns extending from Delhi as far as Sialkot and Lyallpur.—*Commerce Reports.*

Irish Free State.—RIVER LIFFEY SCHEME.—The Irish Free State Joint Parliamentary Committee on the Bills for harnessing the River Liffey for electrical purposes has agreed, now that the Corporation Bill has been withdrawn, to reconsider the preambles of the two rival Bills promoted by private syndicates or companies.

Leeds.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (manager, Mr. C. Nelson Hefford) for the year ended March 31st last show a total revenue of £540,918, as compared with £538,704 in 1923-24. Working expenses amounted to £215,192, as against £205,135, leaving a gross profit of £325,726 (£333,569). Income tax and loan charges absorbed £246,132, leaving a net profit of £79,594 (as compared with £108,559 in the preceding year), of which £41,884 was contributed to capital expenditure, leaving a surplus carried forward of £37,709. The capital expenditure during the year was £330,265, making the total expended on the undertaking £3,812,776. The electrical energy sold amounted to 94,201,072 kWh, an increase of 7,292,702 kWh, and the average price per kWh obtained fell from 1.49d. to 1.38d. The maximum supply demanded rose from 39,900 to 43,500 kW. During the year a 10,000-kW turbo-alternator was installed, and an order was placed for an additional 15,000-kW turbo-generator, together with the necessary boilers, switchgear, &c., which, when installed, will increase the capacity of the station to 82,000 kW. The total amount of mains laid during the year was 111 miles. It is proposed to include the districts of Adel and Alwoodley in the Corporation's area of supply, and application for a Special Order has been made.

London.—BERMONDSEY.—The Electricity Committee has recommended that the following alternative power tariff be adopted:—£1 15s. per quarter per kW, plus 1d. per kWh.

POPLAR.—The Electricity Committee is seeking sanction to a loan of £1,413 for an additional feeder cable from High Street sub-station to Robinhood Lane.

ISLINGTON.—The Electricity Committee has received sanction to the borrowing of £70,000 for electricity extensions.

STOKE NEWINGTON.—The Electricity Committee is applying for sanction to loans of £25,000 for mains and services, £5,000 for meters and £5,000 for domestic apparatus to be let out on hire.

BARKING CABLE TUNNEL.—An engineering feat reached its climax on June 16th, when Messrs. William Muirhead, Macdonald Wilson & Co., Ltd., contractors, who since December last have been boring under the River Thames at a depth of 80 ft. between Barking Creek and Woolwich Arsenal, completed the excavation of a tunnel 3,000 ft. long through which will run the cables that will furnish Kent with electricity from the County of London Co.'s new power station at Barking.

Northern Ireland.—PORTSTEWART (CO. LONDONDERRY).—The Northern Ireland Ministry of Commerce has sanctioned the Urban District Council's application for leave to borrow the necessary sum for purchasing the electricity works from the local committee.

Nottingham.—BREAKDOWN.—A fire which broke out in the cable subway of the main power station early in the morning of June 17th cut off the electricity supply in the city. The fire brigade subdued the flames, but all the cables were destroyed. An electricity supply for lighting and power was resumed at mid-day, a supply being available from another station which is being dismantled, but the tramway service was stopped for the rest of the day. The fire is believed to have been caused by the overloading of a cable, which fused.

Price Reductions.—Reductions in the charges for electricity have been made or recommended in the following districts:—

SIDMOUTH.—Lighting: Varying from 8d. to 5d. per kWh, according to quantity consumed.

BIRKENHEAD.—Heating and cooking: First 1,500 kWh per quarter, from 1½d. to 1d. per kWh; all energy in excess of this amount, from 1¼d. to 1d. per kWh, less 10 per cent.; outside the borough boundary, from 2d. per kWh to 25 per cent. above the borough rates.

BERMONDSEY.—Lighting, flat rate: A reduction of approximately 15 per cent.

Rugby.—BREAKDOWN.—The electricity supply to the town was cut off for nearly ten hours recently, owing to a fault in a cable near the Warwickshire and Leicestershire Power Co.'s station at Warwick. Arrangements were made with the British Thomson-Houston Co., Ltd., to utilise the company's generating plant. The necessary work was carried out by the company's engineers, and by about 10 p.m. a supply was available.

South Africa.—PAARL (CAPE PROVINCE).—The Town Council has decided to vote £7,000 towards the extension and alteration of the existing electrical scheme in accordance with the offer of the Electricity Supply Commission provisionally accepted by the Council.

LADYSMITH (NATAL).—In order to meet the growing needs of the town, the Town Council is to link up with the railway electrification system and to take a bulk supply from the Electricity Supply Commission. The estimated cost of extra plant to meet the increased demand was £9,500, and instead of incurring this expense, the Council wished to dispose of the

entire power station and plant. The supply will be taken in bulk at 6,600 V, and is expected to begin in November next. The total cost of the new equipment necessary for the change-over is about £15,000.

CHARLESTOWN (NATAL).—The power station recently caught fire and was completely gutted. The cause of the fire is supposed to have been sparks from burning grass in the vicinity of the power station.

Southampton.—EXTENSION OF SUPPLY.—The Corporation's sub-station at Eastleigh was formally inaugurated by the Mayoress on June 10th.

Southend-on-Sea.—INQUIRY.—It is announced that the Electricity Commissioners are to hold an inquiry into the Council's proposal to purchase additional Diesel engines for the electricity works and into the condition of the Electricity Department.

Special Orders.—Applications have been made to the Electricity Commissioners for Special Orders by the following authorities:—Clacton Urban District Council for the supply of electricity in the parish of Little Holland; Cheltenham Corporation in the rural district of Tewkesbury and parts of the rural districts of Winchcomb and Cheltenham; the Electrical Distribution of Yorkshire, Ltd., in the rural district of Wetherby and the townships of Carlton and Adel-cum-Eccup.

Stretford.—ELECTRICITY SUPPLY.—The Urban District Council has received consent of the Ministry of Transport to the erection of certain overhead lines in the district for the transmission of electrical energy at pressures of 230 and 250 V.

Sunderland.—ELECTRICITY EXTENSIONS.—The Corporation Electricity Department is to carry out extensions of mains at a cost of £2,518, and to provide foundations and switchgear for two motor generators at Dunning Street station, at an estimated cost of £730.

Wirral.—ELECTRICITY SCHEME.—The Rural District Council has signed an agreement with the Mersey Power Co., Ltd., to take a supply of 5,000 kW annually. The Council proposes bringing the supply of electricity from Ellesmere Port to Moreton through Heswall and Saughall Massie. The scheme will involve an expenditure of £128,000. Wallasey Corporation has intimated its willingness to supply electricity to Moreton at 6d. per kWh and make no charge for laying mains. The Moreton Council (Wirral) has adopted a resolution protesting against the Rural Council's proposal and requesting the Wirral Council to give favourable consideration to the suggestion that the electricity for Moreton be obtained from the Wallasey Corporation.

Tramway and Railway Notes.

Continental.—AUSTRIA.—The Financial Committee of the League of Nations in Geneva has released 88,000,000 gold crowns out of the remaining balance of the Austrian League of Nations' loan for the electrification of the State railway lines Salzburg-Innsbruck-Brenner. The amount in question is placed at the disposal of the Austrian Government in instalments spread over three years.

FRANCE.—Government authority has been given to convert the old steam tramway system between St. Servan, St. Malo, and Paramé to electric traction.

Japan.—TOKIO.—According to *Modern Transport*, work on the construction of 41 miles of underground railways in Tokio, the total cost of which is to be about £13,700,000, has been stopped until a thorough investigation has been made. Tokio is too close to the sea to permit deep "tubes," and it is believed that the open-cut work for which the plans call will result in a settlement of the ground, as the installation of a sewer recently resulted in the streets sinking over 12 inches.

London.—ONE-MAN CARS.—In about a month's time, all cars on the Brentford to Hanwell route of the London United Tramways will be replaced by "one-man" cars. It will be remembered that an experimental car of this type was introduced last June.

Southern Railway Electrification.—The following routes which have been converted for electric traction will be opened for traffic on July 12th:—Victoria and Holborn Viaduct to Orpington; St. Paul's to Shortlands, *via* Catford, and to Crystal Palace (high level); Waterloo to Guildford, *via* Cobham, and Dorking North and Effingham, *via* Leatherhead. The South-Eastern section extends to 115 miles of single track, and 28 trains giving an aggregate service of 448 journeys per day will be put into operation. The cost of the electrification has been £1,600 000. On the South-Western section 67 miles of track has been electrified and the cost of the work on this section has been £833,000.

Swansea.—MUMBLES RAILWAY.—At a recent meeting of the Parliamentary Committee, the Town Clerk reported that the Ministry of Transport had made an Order for the electrification of the Mumbles railway, the objections of the Corporation having been met by the promoters.

"NEVER-STOP" RAILWAY.—The Tramways Committee is making inquiries as to the cost of constructing a "never-stop" railway to the top of Constitution Hill.

Telegraph and Telephone Notes.

"Beam" Radio Stations.—NEW SITE.—At the last meeting of the Spilsby Rural District Council it was decided to offer no opposition to the Government's scheme for the erection of a "beam" radio-telegraph station at Winthorpe, near Skegness, to communicate with Australia and India. The Marconi Co.'s engineers have inspected the site; central control from London will be employed, and the masts will be 300 ft. high. The Dorchester station, which will be used for communication with America, is the most advanced of the "beam" stations, and four masts have already been erected. Bodmin will be the sending station, and Bridgewater the receiving station to and from Canada and South Africa.

Belgium.—NEW RADIO STATION.—Daily radio communication between Belgium and the Belgian Congo has been obtained by the transmitting station at Machelen, near Brussels, using a wavelength of about 100 metres, and the receiving station at Stanleyville, in the Belgian Congo. The power used is about five kilowatts, and the station employs a dismountable pattern of valve of the Holweg type. The Elizabethville Chamber of Commerce recently complained of the paucity of news from Belgium, which hitherto has reached the Belgian Congo *via* Paris and the French Congo, or through the Johannesburg papers. The Government is now building a great radio station at Ruysselede, near Bruges, which will ensure direct communication. The work, however has only just been begun, says *The Times*, and will not be finished until 1928.

Bolivia.—PROPOSED RADIO-TELEGRAPH STATION.—The Director-General of Telegraphs, says *Commerce Reports*, has sent to the President for approval a plan for the installation of a radio station at Puerto Suarez, in the Department of Beni, near the Brazilian border. The receiving station will be at Viacha, near La Paz. Power will be generated by a dynamo coupled to a petrol engine. The estimated cost of the installation is 45,000 Argentine pesos.

European Telephony.—INTERNATIONAL TELEPHONY.—The British Post Office will be represented at both the international conferences that are being held in Paris. The first, which opened on June 22nd and will last nine days, is being held under the auspices of the Union des Syndicats de l'Electricité, and one of the subjects to be discussed is interference between power and communication lines. The second conference will deal with international telephony.

Imperial Wireless Committee.—FIRST MEETING.—The Imperial Wireless Committee—the permanent advisory committee under the chairmanship of the Assistant Postmaster-General on which representations of the Dominions sit—is meeting for the first time this week.

Radio-Telephony in Business.—SOUTH AMERICA.—One of the obstacles to commercial organisation in isolated parts of the world is the absence of developed telegraph and telephone systems, giving facilities for rapid communication upon which frequently depends the success of a business venture. To overcome this difficulty, an increasing number of firms in various parts of the world are installing radio apparatus to keep their branches in remote places in touch with headquarters. One of the latest commercial concerns to employ such means of communication is the Royal Dutch Shell Group, which has installed Marconi equipment to enable its outlying properties in South America to maintain telephonic communication with the local headquarters. The transmitters in use have a power of ½ kW; the receivers, of the type RP 7 have five valves and are self-contained in a teak box, which forms a travelling case should the receivers be required for portable purposes.

Borneo.—MARCONI APPARATUS INSTALLED.—The Sarawak Government is installing Marconi telegraph and telephone instruments in two of its radio service stations, and is also opening new lines of communication by the use of further equipment of similar construction.

Sweden.—AUTOMATIC TELEPHONY.—The Telegraph Administration has, according to *Swedish Export*, contracted with the L. M. Ericsson Co. for the erection of a new automatic station in Stockholm with a capacity of 20,000 subscribers. The Vasa station, which was coupled in some time ago, has been increased from 5,000 to 8,000 lines, and the Kungsholmen station for 12,000 lines is under construction. The station just ordered is expected to be ready in 1928.

The Electrophone.—SERVICE TO END.—The electrophone service, which for many years has enabled subscribers to the ordinary telephone service to hear theatrical plays, concerts, church services, &c., in their homes, is to terminate on June 30th. Many subscribers have given up the "hearings" in favour of broadcast radio reception, and as the revenue has largely decreased, the Postmaster-General has decided to withdraw the licence granted to the Electrophone Co.

The Telephone Service.—DEVELOPMENT PLANS.—The Postmaster-General, Sir William Mitchell-Thomson, addressing the Sheffield Chamber of Commerce recently, is reported to have said he hoped before the summer recess to propose a programme of development for the telephone service for the next few years. "I do not like to see this country standing tenth or eleventh on the list of the great telephone-using countries of the world," he said.

CALL RECORD.—The number of calls in the London telephone area last week passed the ten million mark for the first time in the history of the service. The latest return (June 1st) gives the number of telephones in the area as 455,640, an increase of 3,055 "stations" since May 1st.

SOUTH WALES AUTOMATIC EXCHANGES.—Two new Strowger automatic telephone exchanges were opened for public service on the 16th inst. in the Newport (Mon.) area. They link up with the existing Strowger automatic installation at Newport, which was installed for the British Post Office as far back as 1915. The exchange at Newport, now serving some 2,400 subscribers, created a demand for equal facilities in outlying districts, and this is now being met by the opening of two exchanges at Risca and Cwmbran respectively. Both installations are of the rotary P.B.X. type, comprising single units, that at Risca being equipped for 57 subscribers and three coin-box lines, whilst the Cwmbran unit has 76 subscribers' and four coin-box lines. Although the system is four-digit in both cases, the local line switch units are only equipped with rotary line switches, final selectors, and repeaters the first and second group selectors being located at Newport main exchange. Risca has six outgoing and 11 incoming junctions, whilst Cwmbran is equipped with eight outgoing and 12 incoming junctions, in addition to the two outgoing coin-box junctions. As in the case of the original Newport installation, the equipment for the new exchanges has been manufactured and installed for the Post Office by the Automatic Telephone Manufacturing Co., Ltd.

Turkey.—RADIO STATION TENDERS.—The second tenders for erecting a high-power wireless station at Angora capable of communicating with all world stations will be dealt with almost immediately, says the *Morning Post*. The first adjudication was annulled about five months ago by the Turks "for administrative reasons." The specification for the Angora station will run into figures for which Turkey's budgetary resources are unprepared. The scheme would possibly even absorb two years' complete credits for posts and telegraphs. The contract is being fought for by the German companies, though they will have to give the Turkish Government an engagement that they are not infringing any patent rights. The French and British companies may be last in the field, but it would not be surprising to see the scheme held up again for a time when the Turks realise what it involves.

Radio Notes.

Aerials.—NEW BILL.—On June 11th, the House of Lords Standing Committee passed a provision in the Public Health Bill which gives local authorities power to prevent danger or obstruction to persons using the streets caused by radio aerials or other apparatus that might be liable to fall on them. This measure will enable local authorities to acquire the right, which they have not hitherto had, of prohibiting the use of aerials over streets and any "public place."

Daventry.—JULY OPENING.—It is reported that Sir W. Mitchell-Thomson, Postmaster-General, will inaugurate on July 27th the new B.B.C. station at Daventry which is to replace the experimental station at Chelmsford. The power will be 25 kW to the oscillator, and the station, which will be known as 5XX, will operate on a wavelength of 1,600 metres. Programmes will be arranged and given in the London Studio.

Germany.—AUTHORS' RIGHTS.—A decision of importance to the German broadcasting companies has been given in a Berlin Court of Appeal. According to *The Times*, two cases affecting the Funkstunde (Berlin) and the Mitteldeutsche Rundfunk A.G. (Leipzig) had come up for rehearing. In the first, the Berlin broadcasting station had been condemned to pay damages in a lower Court for having broadcast Herr Hugo von Hoffmansthal's drama "Der Tor und der Tod," without permission. The plaintiff in the second case, who had also been successful at the first hearing, was Herr Gerhart Hauptmann, whose play, "Hanneles Himmelfahrt," had been broadcast from Leipzig without the author's authority. The Mitteldeutsche Rundfunk was restrained by a temporary injunction from repeating the performance. In both cases the appeals of the broadcasting companies were dismissed.

New Radio Bill.—FIRST READING.—Sir William Mitchell-Thomson, the Postmaster-General, formally introduced the new Bill on Monday afternoon, June 22nd. The object of the Bill is mainly to "explain the meaning of the expressions 'transmission' and 'rent or royalty,' where used in certain provisions of the Wireless Telegraphy Act, 1904."

Spain.—NEW STATION.—King Alfonso broadcast a speech at the official inauguration of the Union Radio Co.'s broadcasting station in Madrid at noon on June 16th, on a wavelength of 440 metres. The station's call sign is EAJ20 and its power 4 kW.

Trinity House Installations.—LIGHTSHIPS.—A broadcast radio-receiving outfit has been provided by Trinity House on board lightship No. 67, which does duty off the Suffolk coast. Other lightships and lighthouses are being similarly equipped in order to relieve the monotony of the keepers' lives.

HOSPITAL INSTALLATIONS.—Receiving apparatus is being installed in an increasing number of hospitals and public institutions. The Hackney (London) guardians of the poor are spending £160 on plant for the infirmary, and the Hounslow (Middlesex) hospital is to be equipped.

Messrs. Gent & Co., Ltd., have recently installed at the Cottage Hospital, Crewe, a complete outfit consisting of 54 pairs of headphones and four loud-speakers, which may be used simultaneously, the receiving set being the standard "Tangent Radiomatic" type "B" four-valve instrument. In the hospital is a distribution board similar to a telephone exchange, and the operator can plug in either the headphone or loud-speaker circuits to any of the wards or rooms. It is a noteworthy fact that this number of headphones and loud-speakers can be operated from a four-valve instrument employing, of course, power valves, with a very slight drop in signal strength when all the 'phones and speakers are working.

U.S.A.—STORM WARNING.—America is making use of radio apparatus for a new commercial purpose. A large receiving station has been erected on Manhattan Island solely to trap atmospherics caused by approaching thunderstorms, say Press reports, and distant flashes of lightning are made to ring an alarm bell automatically, the frequency of the ringing corresponding to the nearness of the storm. By this means electric light companies are enabled to gauge the approach of storms several hours before they arrive. Usually they get about six hours' notice, ample time for the engineers in the power houses to meet increased demands for electricity owing to darkness caused by the storm. Since this system has been in operation, the inconvenience caused by thunderstorms in New York to power companies and their customers has been greatly reduced.

Contracts Open and Closed.

(The date given in parentheses at the end of the paragraph indicates the issue of the ELECTRICAL REVIEW *in which the "Official Notice" appeared in our advertisement pages.)*

Open.

Australia.—SYDNEY.—September 9th. New South Wales Railway Commissioners. One electric travelling jib crane and maintenance for 12 months. (A.X. 2,120.)*

Aylesbury.—Electricity Works. One 400-kW rotary converter. (June 12th.)

Bishopstoke.—June 27th. Hants. County Council. Electric light installation, tuberculosis sanitarium. Mr. A. L. Roberts, county architect, The Castle, Winchester. (Returnable deposit of £1 1s.)

Bridgend.—July 31st. Penybont Rural District Council. Kenfig Hill electricity scheme. L.p. underground and overhead mains, transformers, switchgear, meters, and house wiring. (See this issue.)

Cheadle and Gatley.—June 30th. Urban District Council. Transformer and sub-station switchgear. Electrical Engineer, 37, High Street, Cheadle. (Returnable deposit of £1 1s. for each contract.)

Doncaster.—Wiring, &c., electric lighting, Balby Bridge Working Men's Club. Mr. H. Bexon, secretary.

Dundee.—July 17th. Electricity Department. Steam and exhaust pipes. (See this issue.)

Edinburgh.—July 9th. Education Authority. Electric lighting installation at three schools. Schedules from the Executive Officer, Education Offices.

Egypt.—CAIRO.—July 9th. Director of the Section of Local Municipalities and Commissions (Savoy House), Cairo. Supply and installation of an electrical system at Zifta.

Inspecting Engineer in London, Queen Anne's Chambers, S.W. Supply of 8,000 metres submarine cable.—*Reuter's Trade Service* (Cairo).

Fife.—July 6th. Education Authority. Electric lighting work in connection with the addition to Leslie Public School. Schedules from Master of Works, Fife Education Authority, Kirkcaldy.

Grimsby.—June 29th. Electricity Department. Cooling tower superstructure and pipework. (June 12th.)

July 4th. Electricity Department. 15,000 yd. p.i.l.c. l.p. cables. (June 19th.)

Hemsworth.—July 6th. West Riding Education Committee. Electric lighting at Council school. Specifications, &c., from Education Department, County Hall, Wakefield.

India.—SIMLA.—July 20th. Indian Stores Department. Diesel-engine alternator sets, water-cooling units, oil fuel storage tank, oil-purifier equipment, 10-ton overhead crane, switchboard, cables, transformers, e.h.p. feeder cables, &c.*

Littleborough.—July 8th. Urban District Council. 6,600-V cables, roadwork, &c., transformer, switchgear, and cable connections for new sub-station. (June 19th.)

London.—LONDON COUNTY COUNCIL.—June 29th. Electric lighting installation at Holcroft Road School, Hackney. (June 12th.)

H.M. OFFICE OF WORKS.—July 3rd. Supply of mechanical and electrical engineering labour in the Manchester district during a period of three years from August, 1925. (June 19th.)

BATTERSEA.—July 21st. Electricity Department. One 10,000-kW turbo-alternator, with condensing plant, switchgear, and two 65,000-lb. per hour boilers, with pipework and ash-handling plant. (June 19th.)

STEPNEY.—July 8th. Board of Guardians. Electrical fittings for two months. Forms of tender from Mr. F. J. Tootell, Guardians' Offices, 74, Vallance Road, Whitechapel, E.1.

LEWISHAM.—July 6th. Board of Guardians. Installation of electric clocks at the Hospital, High Street, Lewisham, S.E. (See this issue.)

H.M. OFFICE OF WORKS.—July 9th. One 110-V, 3,500-Ah secondary battery for the National Physical Laboratory, Teddington.

Loughborough.—July 9th. Poor Law Institution. Installation of electric lighting at the Institution. Plans and specifications from Mr. E. G. Phillips, consulting engineer, Queen's Chambers, King Street, Nottingham.

Manchester.—July 1st. Electricity Committee. Twelve months' supply of electricity meters, potential and current transformers time switches, and 3-pint electric kettles. (June 19th.)

New Zealand.—WELLINGTON.—July 21st. Public Works Department. Two electrically-operated water-level indicators.*
INVERCARGILL.—Electricity Department. 2,200 ft. .1 sq. in. 11,000-V cable; 80 ft. .3 sq. in. 3,300-V cable and spares.*

Normanton.—June 27th. Electric lighting installation at the Boys Grammar School. Specifications from Mr. T. R. Robinson, Clerk to Governors, Technical School, Normanton.

Rochdale.—July 1st. Borough Council. Electrification of sludge-pressing machinery, Roch Mills sewage disposal works. Supply of electrically-driven air compressor. Particulars from Mr. S. H. Morgan, borough engineer, Town Hall.

Salford.—June 29th. Board of Guardians. Supply and erection of electrical massage and X-ray apparatus at Union Infirmary, Hope, Pendleton. Particulars from Mr. E. H. Inchley, clerk to the Board of Guardians, Poor Law Offices, Eccles New Road.

Skipton.—July 10th. Electricity Department. L.p. cable. (See this issue.)

Stoke-on-Trent.—July 7th. Electricity Supply Department. Two 25-kVA transformers and electrically-driven grab crane. (June 19th.)

South Africa.—CAPE TOWN.—July 22nd. Electricity Department. Pumping equipment: Two motor-driven pumps, switchgear, &c. (A.N. 2,086.)*

Thirsk.—July 14th. Electricians' work required in erection of Thirsk and Sowerby Institute. Particulars from Mr. C. Lee, Millgate Thirsk.

Tunbridge Wells.—July 8th. Electricity Committee. One 3,000-kW turbo-alternator, with condenser, piping, and cables, one cooling tower, steam piping, &c. (June 5th.)

Uruguay.—MONTEVIDEO.—July 28th. State Electricity Supply Works. 15 equipments (switchboard, feeder cubicle, &c.) for transformer sub-stations.*

West Ham.—July 20th. Education Committee. Wiring of eight schools. (See this issue.)

Winchester.—July 10th. Electricity Department. One 1,250-kW, d.c. geared turbo-generating set, with condensing plant, &c. (June 12th.)

Worksop.—June 27th. Electricity Department. Two Diesel or semi-Diesel engines, direct coupled to two 300-kW d.c. generators; engine room extension; overhead travelling crane; oil storage tanks and pumps. (June 12th.)

*Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Closed.

Bedford.—Electricity Committee. Accepted:—
Four steam meters (£387), temperature indicators and thermometers (£64).—The Electric Flow Meters Co.
Eight draught gauges (£33).—Alex. Wright & Co.
Two indicating and recording instruments (£117).—Cambridge Instrument Co., Ltd.

Croydon.—Electricity Committee. Accepted:—
Locomotive at the railway siding (£1,280).—English Electric Co., Ltd.
Tramways Committee. Accepted:—
Feeder panels (£456).—British Insulated & Helsby Cables, Ltd.

Government Contracts.—The following Government contracts were placed during May, 1925:—

ADMIRALTY CONTRACT AND PURCHASE DEPARTMENT.
Battery.—Fuller's United Electric Works, Ltd.
Battery spares.—Chloride Electrical Storage Co., Ltd.
Battery panels.—Bertram Thomas.
Branch breakers.—Whipp & Bourne, Ltd.
Cells.—London Battery & Cable Co., Ltd.
Repair of condensers.—British Insulated & Helsby Cables, Ltd.
Conduit accessories.—Credenda Conduits Co., Ltd.; Simplex Conduits, Ltd.; Electrical Conduits, Ltd.; Barton & Sons, Ltd.; Perfecta Seamless Steel Tube & Conduit Co. (1923), Ltd.
Electric generating set.—W. H. Allen, Sons & Co., Ltd.; Vickers-Petters, Ltd.
Frame works.—General Electric Co., Ltd.; Park Royal Engineering Co., Ltd.
Heterodyne units.—H. W. Sullivan, Ltd.
Lamp fittings.—McGeoch & Co., Ltd.
Motor-alternator equipments.—Newton Bros. (Derby), Ltd.
Motor-generator and spares.—Newton Bros. (Derby), Ltd.
Repair of motor-generator sets and starters.—Electric Construction Co., Ltd.
Spares for dynamo.—Laurence Scott & Co., Ltd.
Automatic starters and switches.—Watford Electric & Mfg. Co., Ltd.
Switchboards.—Whipp & Bourne, Ltd.
Switches.—McGeoch & Co., Ltd.; Park Royal Engineering Co., Ltd.; Player & Mitchell; Veritys, Ltd.; Whipp & Bourne, Ltd.
Switches and resistances.—General Electric Co., Ltd.
Testing bench.—Crompton & Co., Ltd.
Transmitters.—H. W. Sullivan, Ltd.
Valves, &c.—Mactaggart, Scott & Co., Ltd.
Boards for wireless telegraphy.—General Electric Co., Ltd.; McGeoch and Co., Ltd.; Veritys, Ltd.; Whipp & Bourne, Ltd.

WAR OFFICE.
Aluminium.—British Aluminium Co., Ltd.
Torch batteries.—Siemens Bros. & Co., Ltd.
Electric cable.—Western Electric Co., Ltd.
Generating sets.—W. H. Dorman & Co., Ltd.; Ruston & Hornsby, Ltd.
Lead sheathing.—W. T. Henley's Telegraph Works Co., Ltd.
Torches.—General Electric Co., Ltd.

AIR MINISTRY.
Amplifiers.—Gambrell Bros.
Telephone attachments.—Pyne Mfg. Co., Ltd.
Motor alternators and switchboards (Kidbrooke).—Electric Construction Co., Ltd.
Electric cable.—Enfield Cable Co., Ltd.
Metal-braided cable.—British Insulated & Helsby Cables, Ltd.
Condensers.—Dubilier Condenser Co. (1921), Ltd.
Filament lamps.—A. C. Cossor, Ltd.
Instruments for transmitters.—E. Turner.
Magnetos and spares.—Simms Motor Units (1920), Ltd.
Receivers.—Gambrell Bros.
Voltage regulators.—British Radio Corporation, Ltd.

POST OFFICE.
Telephone apparatus.—Automatic Telephone Mfg. Co., Ltd.; British L. M. Ericsson Mfg. Co., Ltd.; General Electric Co., Ltd.; Phœnix Telephone & Electric Works, Ltd.; Siemens Bros. & Co., Ltd.; Sterling Telephone & Electric Co., Ltd.; Telephone Mfg. Co., Ltd.; Western Electric Co., Ltd.
Testing and protective apparatus.—General Electric Co., Ltd.; International Electric Co., Ltd.; Phœnix Telephone & Electric Works, Ltd.
Wireless apparatus.—Mullard Radio Valve Co., Ltd.
Battery stores.—Alton Battery Co., Ltd.; General Electric Co., Ltd.; Siemens Bros. & Co., Ltd.
Cable (various).—British Insulated & Helsby Cables, Ltd.; Connolly's (Blackley), Ltd.; Enfield Cable Works, Ltd.; General Electric Co., Ltd.; W. T. Glover & Co., Ltd.; Hackbridge Cable Co., Ltd.; W. T. Henley's Telegraph Works Co., Ltd.; Pirelli General Cable Works, Ltd.; Union Cable Co., Ltd.; Western Electric Co., Ltd.
Joint-box castings.—Ladywood Ironworks, Ltd.
Cords for telephones.—British Insulated & Helsby Cables, Ltd.; Siemens Bros. & Co., Ltd.; Ward & Goldstone, Ltd.
Lamps.—General Electric Co., Ltd.; British Mannesman Tube Co., Ltd.; Cochrane & Co., Ltd.
Fibre ducts.—Key Engineering Co., Ltd.
Insulating tape.—Ioco Rubber & Waterproofing Co., Ltd.
Copper and bronze wire.—Elliott's Metal Co., Ltd.
Manufacture, supply, drawing-in and jointing cable.—Pontypridd-Treforgandy, and Edinburgh-Falkirk: British Insulated & Helsby Cables, Ltd. East Grinstead-Uckfield and Birmingham-Stratford-on-Avon: Western Electric Co., Ltd. Purley-East Grinstead: W. T. Henley's Telegraph Works Co., Ltd. North Shields-Whitley Bay: Siemens Bros. & Co., Ltd.
Telephone exchange equipment.—Maryland, Museum, East, Mayfair, Stanningley (Leeds): Automatic Telephone Mfg. Co., Ltd. Beakey Heath: Siemens Bros. & Co., Ltd. Sub-contractors: Hart Accumulator Co., Ltd., for cables; English Electric Co., Ltd., for charging machine; Crompton & Co., Ltd., for ringing machines. Swansea: Siemens Bros. & Co., Ltd. Chester, Rusholme, Clissold: Western Electric Co., Ltd.
Private branch exchange equipment.—A. Balfour & Co., Ltd. (Sheffield); Shell-Mex, Ltd. (Glasgow): Relay Automatic Telephone Co., Ltd.
Telephone repeater station—cord circuit repeater equipment.—Bristol: General Electric Co., Ltd.

CROWN AGENTS FOR THE COLONIES.
Electric generator, &c.—Ruston & Hornsby, Ltd.
Spare parts for train-lighting equipment.—J. Stone & Co., Ltd.
Telegraph poles, &c.—Siemens Bros. & Co., Ltd.
Telephone cable, &c.—Johnson & Phillips, Ltd.
Automatic telephone equipment.—Peel-Conner Telephone Works, Ltd.
Transformers, &c.—Metropolitan-Vickers Electrical Export Co., Ltd.
Copper line wire, &c.—T. Bolton & Sons, Ltd.
Copper wire, &c.—F. Smith & Co. (Inc. in the London Electric Wire Co. and Smiths).
Wireless apparatus.—Marconi's Wireless Telegraph Co., Ltd.

Hertford.—Town Council. Accepted:—
Wiring 24 houses for electric light (£144); 110 houses (£641).—J. W. Russell.
Laying mains to the houses (£86 and £93 respectively).—North Metropolitan Electric Power Supply Co.

Ilford.—According to the daily Press, the Urban District Council has placed an order for electric cable, valued at £15,000, with the German Cable Works, Berlin. It is stated that the nearest British offer was 17 per cent. higher than that of the German works, which promised delivery within six weeks as against 12 or 13 weeks required by the British firms. A Swiss quotation was received, which was also lower than the British.

Irish Free State.—Contracts placed by the Controller of Stores, Department of Posts and Telegraphs, during May, 1925:—
Porous cells.—General Electric Co., Ltd.
Earpieces for telephones.—Traun Rubber Co., Ltd.
Electric lamps.—Sphinx Electric Supplies (Ireland), Ltd.
Mouthpieces for telephones.—North British Rubber Co., Ltd.
Telegraph apparatus.—T. W. Leach, Ltd.; J. & E. Kronenberg A.-G.
Telephone cabinets.—Siemens Bros. & Co., Ltd.
Telephone instrument parts.—F. W. Lowenadler.
Telephone lamps.—General Electric Co., Ltd.
Underground cable.—J. Steel & Sons.
Copper and g.i. wire.—W. F. Dennis & Co., Ltd.
—*Irish Electrician.*

London.—Lamp Contract.—The Admiralty has placed a contract for 12,000 "Osram" standard vacuum-type lamps with the General Electric Co., Ltd.

ST. MARYLEBONE.—Electric Supply Committee. Recommended:—
E.h.p. switchgear for sub-stations (£563).—Ferguson, Pailin, Ltd.
Three 1,500-kVA, 3-phase air-cooled transformers (£4,181).—British Electric Transformer Co., Ltd.
Reconditioning 8,000-kW turbo-alternator (£350).—General Electric Co., Ltd.

Southend-on-Sea.—Town Council. Accepted:—
Oil separator for the Diesel plant at the Leigh generating station (£213).—De Laval-Chadburn Co.

Forthcoming Event.

International Congress of Radiology.—July 1st to July 4th. At the Central Hall, Westminster, S.W. Reception, June 30th, at the Royal Society of Medicine, Wimpole Street, W., at 8.30 p.m.

Notes.

The "Curbstone" Contractor. — With reference to the discussion on Mr. L. L. Robinson's paper on "Installation Policy," read at the I.M.E.A. last week, we have received at the moment of going to press the following letter from Mr. Leonard G. Tate, Secretary of the Electrical Contractors' Association (Inc.):—

"I regret that time did not permit me to speak, but I shall be much obliged if you will note that although during the discussion a reference was made by nearly all the speakers to the 'Curbstone' contractor, my Association does not apply this word to the established contractor, however small his business may be. My Association is prepared to take into membership any genuine electrical contractor having an established place of business, and who depends for his livelihood on such contracting business, but we do not admit journeymen working on their own in their spare time who are either in regular employment, or who may be temporarily out of such employment. My Council is anxious to see the Registration of Electrical Contractors carried to its fullest possible limit, and does not desire in any way to prevent any person starting in business as an electrical contractor, assuming, of course, that such person has the necessary capital and technical knowledge to enable him to successfully carry on the business."

The "Crested Eagle." — The latest addition to the General Steam Navigation Company's fleet of pleasure steamers is the *Crested Eagle*, which was recently launched from the yard of Messrs. J. Samuel White & Co., East Cowes. The new vessel is finely appointed, being electrically lighted and ventilated throughout. The power plant consists of three sets, comprising Sisson vertical steam engines direct-coupled to 8-kW Crompton dynamos generating at a pressure of 110 V (500 r.p.m.); and a 3.5-kW oil-engine set. These machines and the switchboard, as well as most of the other electrical equipment, were supplied by Messrs. Telford, Grier and McKay, Ltd. The lighting, for the greater part, is carried out by simple but handsome ceiling fittings with cut-glass globes which totally enclose the lamps. In the well arranged main dining saloon the fittings are nickel-plated. Four motor-driven fans supply air to the aft and forward parts of the boat. The air is sent through ducts in which openings occur at frequent intervals, each of these being provided with a ball shutter with a hole in its centre. This arrangement permits of the closing of the vent or the directing of the air stream as required. The reciprocating steam engines which turn the side paddles are fed from oil-fired boilers. The *Crested Eagle* develops 3,500 h.p., and is about 300 ft. long and 68 ft. in beam across the sponsons.

The Shannon Power Scheme.—During Committee stage on the Shannon Electricity Bill in the Irish Free State Senate, Sir John Purser Griffith suggested that the Government should have powers to utilise not only the waters of the Shannon but those of every river in the country for the purpose of generating electricity. He had no faith in the Siemens-Schuckert plans for the Shannon scheme as embodied in the Bill; he would like to see the Bill made a truly national measure, because there was very little hope of electricity undertakings being started in the Free State by private enterprise.

Mr. McGilligan, Minister for Industry and Commerce, declined Sir John's suggestion, observing that it would provide material for a separate Bill. Such a Bill, he said, would come sooner than many people were inclined to think.

An amendment by Sir John Keane was accepted, making it mandatory on the Government to publish an account of the business done by the undertaking not later than six months from the end of every financial year.

Sir John Keane moved an amendment to provide that the charges for electricity should be such as to cover the cost of production, distribution, maintenance and administration, and all capital charges, including a reserve for the replacement and the betterment of machinery and plant, a general principle to be that the undertaking should be carried on, as far as practicable neither at a profit nor at a loss and that charges should be adjusted accordingly from time to time. The Government opposed the amendment, which was rejected. The Committee stage was concluded, and the Bill also passed the Report stage.

At a meeting of the Free State Joint Parliamentary Committee on the Syndicate and Corporation Bills for the harnessing of the River Liffey for electricity purposes, it was announced that in view of the opposition of the Ministry of Industry and Commerce the Corporation Bill would not be proceeded with. The two rival Bills were private Bills and had been ruled out by the Committee, which, however, had accepted the Corporation Bill. It is understood that the Government will not compensate the promoters of any of the Liffey Bills, the contention being that they had early notice of the Shannon scheme and could have avoided the heavy costs incurred had they chosen to do so.

Mr. F. A. J. Fitzgerald, a past-President of the American Electrochemical Society, a director of the Fitzgerald Electrochemical Laboratories at Niagara Falls, and consulting engineer on electrochemistry to the Niagara Falls Power Company, recently read a paper before the Dublin Rotary Club on "Some Economic Features of the Shannon Scheme." He argued that the scheme did not show the economic factors deduced from general principles and exemplified by the water power development of the United States.

"Your greatest market for power at present is in Dublin," he remarked, "situated something like 120 miles from the proposed hydro-electric plant of the Shannon. What about economical distribution?

"The Shannon Scheme lacks at least three fundamental economic factors of a successful hydro-electric development.

"So far as can be seen now there is no immediate prospect of 100 p.c. load-factor plants building in Limerick or in the immediate vicinity of the power plant, which will take large blocks of power. Then leaving Dublin out of consideration, we see an immense high-voltage distribution network all over the Free State; and what is the load factor on this system going to be? I fear it will be very low for some time, because the building up of a high load factor, even in industrial centres, is by no means an easy task, and in agricultural communities is much harder.

"The inevitable consequence of this is that the cost of the current to those in sparsely populated places is bound to be excessively high if the consumers there pay their proper share of the cost of distribution.

"The great objection to a scheme like this is that like all Government-owned and operated manufactures in democratic countries, it is difficult to run it on good commercial principles.

"Those responsible for its administration are forced to commit economic sins in order to satisfy the voters, who are not competent to judge the extremely difficult and complex laws which govern successful commercial working, and this will happen no matter how competent the administration may be.

"Economically I believe that whichever is the best of the various Liffey schemes is the way to begin your electrification of the Irish Free State. Even that is no child's play, but it is a good commercial proposal, and with proper direction will meet with success and have a wonderful educational value.

"Finally, if you want to reach the highest degree of prosperity let your water-power developments be carried out by private effort, though of course, under proper Governmental control."

The English Electric Co.'s Ambulance for a Town.—The English Electric Co., Ltd., Preston, has offered its 40-h.p. motor ambulance to the Preston Corporation for the use of the town. In accepting the offer, the Building Committee proposes that the best thanks of the Council be tendered to the company for its very handsome gift.

Sir Ian Hamilton and the "Batti-Wallahs."—At a luncheon given by the "Batti-Wallahs" Society on June 17th, General Sir Ian Hamilton, the principal guest, speaking on the problem of finding work for unemployed ex-service men, and the work of the British Legion in that connection, said that the British Legion had done a great deal to help; it had advanced loans to the extent of £125,000, and of that sum £42,000 had been repaid. What the unemployed really wanted was work, and he urged that the "Batti-Wallahs" should use all their influence on the Government to get big engineering works put into hand which would provide work for all and at the same time would not be a waste of money as the dole was. They wanted barrages built in the rivers to provide electricity, more roads provided, and any kind of work put in hand which would provide plenty of digging. The British Legion, in addition, had joined up with the American Legion and other foreign organisations of the same kind, and in so far as they could carry those organisations with them they spoke for 5,000,000 ex-service men and they were working hard to prevent war anywhere. Mr. L. M. Waterhouse moved a vote of thanks. Messrs. J. S. Highfield, Roger Smith, W. E. Highfield, and F. P. Fletcher, O.B.E., were among the guests.

Faraday's Discoveries.—The centenary of the discovery of benzene by Michael Faraday was celebrated on June 16th by a reception given by the Royal Institution, the Chemical Society, the Society of Chemical Industry, and the Association of British Chemical Manufacturers. The Royal Institution Lecture Theatre, in which the gathering took place, was filled with distinguished scientists of this country and from many parts of the world.

Coal Resources Survey.—In pursuance of the policy of carrying out a physical and chemical survey of the national coal resources, with the help of local committees, the Fuel Research Board has appointed a committee to deal with the coal seams in the North Staffordshire area. The committee is representative of the North Staffordshire Colliery Owners' Association, the North Staffordshire Institute of Mining Engineers, the Geological Survey of Great Britain, and the Fuel Research Board.

Canadian Hydro-Electric Power Exports.—The Toronto correspondent of *The Times* reports that on June 15th the Dominion Parliament adopted a resolution declaring that the export of hydro-electric power from Canada should be permitted only on an annual licence and that no licence for export should be granted in addition to those already operating without the concurrence of the province or provinces in which it is proposed to develop the power concerned and the other provinces adjacent to such a development and interested therein. As a result it is thought that the export of power will cease to be a factor in Federal politics.

International Congress of Radiology.—Next week an international congress of radiologists (preliminary meeting) will sit in London, at the Central Hall, Westminster, for which the British Institute of Radiology has made the necessary arrangements. A preliminary reception will be held on

June 30th at the house of the Royal Society of Medicine, and the congress will be opened on the following day by the Duke of Connaught, supported by the Minister of Health; in the evening the Silvanus Thompson Memorial Lecture will be delivered by the Duc de Broglie. The meetings for papers and discussions will continue until Saturday, July 4th; the congress dinner will take place on Thursday evening, and on Friday there will be a luncheon to foreign members, organised by the League of Nations Union. At the close of the congress a meeting of international delegates will be held to form an international committee. An exhibition of X-ray and electro-medical apparatus will be held at the Central Hall from July 1st to July 4th, to which the public will be admitted on the afternoon of Friday, July 3rd.

Appointments Vacant.—Chief electrical engineer (£720) for the Railway Department of the Government of Nigeria. Lighting engineers to give lectures and demonstrations in the provinces for the E.L.M.A. Engine room attendant for the Stratford-on-Avon Electricity Co., Ltd. Borough electrical engineer (£1,015) for the County Borough of West Hartlepool. Technical assistant (Rs. 1,125 monthly), for the Calcutta Electric Supply Corporation, Ltd. (See our advertisement pages to-day.)

The Shannon Scheme: Appointments Advertised.—By advertisement in the Irish Press, applications are invited by June 29th for the following posts on the civil construction staff for the above scheme:—One resident engineer (£800), one administrative officer (£650), one chief office assistant (£600), and 12 assistant engineers (at from £500 to £200 per annum). Further particulars and forms of application may be obtained from the Secretary, Civil Service Commission, 33, St. Stephen's Green, Dublin.

Institution Notes.

Association of Mining Electrical Engineers.—SOUTH WALES BRANCH.—The summer meeting of the above-named Association was held in Cardiff and district during the week ending on June 13th; members attended from all parts of the country, and a number of ladies took part in the proceedings. On the Tuesday evening the visitors were welcomed by Mr. Theodore Stretton, the new branch president, and members of the reception committee. On Wednesday morning the party left Cardiff by steamer for Weston-super-Mare, and after luncheon travelled in charabancs to the Cheddar Gorge and subsequently to Wells. On Thursday morning a visit was paid to the Llantrissant Colliery of the Powell Duffryn Steam Coal Co., luncheon being provided by the company and in the afternoon a circuitous route, *via* Ogmore and Southerndown along the coast, was followed to Whitchurch, where the Melingriffith Tinplate Works were inspected, and tea was provided. In the evening there was a civic reception and dance in Cardiff. The council of the Association having met on the Friday morning, the annual general meeting was held at the South Wales Institute of Engineers at Cardiff, Mr. G. Raw (Durham), the retiring president, occupying the chair. Mr. T. Stretton delivered his presidential address, and subsequently Mr. H. Spence Thomas presided over a representative gathering of members of the A.M.E.E. (South Wales Branch), the Western Centre of the I.E.E., and the South Wales Institute of Engineers, when Major E. Ivor David's paper on "Electricity in Mines" was read and discussed. In the evening a dinner was held at the Park Hotel.

Institution of Heating and Ventilating Engineers (Inc.).—At the annual summer meeting of the Institution at Birmingham on June 23rd, Mr. Herbert G. Cathcart read a paper on "Hot-water Supply Installations for Large Hospitals," in the course of which he gave some interesting figures and exhibited a number of graphs, taken from installations of the Metropolitan Asylums Board, showing the hourly consumption of hot water over the 24 hours of the day both Sundays and weekdays. He warned his hearers of the vital importance of using none but the best non-conducting covering composition for covering the pipe lines, &c.; the Board used only pure magnesia and plastic asbestos, and required 85 per cent. efficiency, otherwise the material was rejected.

Our Personal Column.

The Editors invite electrical men, whether connected with the technical or the commercial side of the profession and industry, also electric tramway and railway officials, to keep readers of the* ELECTRICAL REVIEW *posted as to their movements.

Sir PHILIP NASH, chairman, and Mr. P. N. RAND, general sales manager, of the Metropolitan-Vickers Electrical Co., Ltd., returned by the *Aquitania* from their six weeks' tour in the United States of America. The object of their visit, we understand, was to study the electrical conditions in that country in relation to similar developments in Great Britain, as well as to meet their manufacturing friends and to discuss future development.

At the annual meeting of the Electrical Contractors' Association (Inc.), held on June 18th, Mr. T. E. ALGER, A.M.I.E.E., was elected president for the ensuing year. Mr. Alger is a partner in the firm of Messrs. R. Alger & Sons, Ltd., electrical heating and sanitary engineers, of Newport and Cardiff. The firm was established by his father, the late Mr. Rowland Alger, in 1859. At the close of his electrical training Mr. Alger returned to Newport to take charge of the electrical branch of the business. He has always been keenly interested in E.C.A. matters, and was one of the first provincial members, and an active promoter of the branch in South Wales, of which he was chairman for several years. He is also a member of the National Joint Industrial Council for the Electrical Contracting Industry. We believe that Mr. Alger represents personally the broader and more vigorous outlook that is developing in E.C.A. circles and is the first president to be elected from the Western Section of the Association.

Photo by] [*Elliott & Fry.*

Mr. T. E. Alger,
The New President of the Electrical Contractors' Association (Inc.).

The Colchester Tramways Committee has expressed its thanks to Mr. R. C. BULLOUGH, the manager, and his staff for the efficient running of the system during the past year. Owing to Mr. Bullough's state of health, it is not proposed to recommend a further extension of his period of service after October 1st. Councillor Wright, chairman of the Committee, said at a recent Council meeting that Mr. Bullough had been with them since 1901, and was a loyal worker and most assiduous in his duties. The Committee would take into consideration the question of appointing another manager.

Mr. L. B. CHUBUCK, of the Canadian Westinghouse Co., Ltd., has been elected chairman of the Toronto Section of the American Institute of Electrical Engineers.

Aylesbury Town Council has increased the salary of the borough electrical engineer, Mr. W. A. TURNELL, from £570 to £660 per annum, the salary to be further considered next February.

Reuter reports that Mr. MORRIS KRAMER, president of the Federated Chamber of Industries (South Africa), was due to arrive in England on June 22nd for a tour of the country, including visits to the most important centres, with the object of investigating British manufacturing problems.

An Irish correspondent reports that Mr. WILLIAM A. TRAILL, who in 1883 harnessed the River Bush for the electricity supply to the Giant's Causeway electric tramway (of which undertaking he is now chairman), was married recently to Miss NORA WOODHOUSE, of Preston, whom he saved from drowning 30 years ago.

The Hawarden Rural Council has received 289 applications for the position of clerk of the works for its electricity distribution scheme. The Electricity Committee meets this week to select 50 candidates out of that number and subsequently three will be chosen to appear before the Council.

The London County Council Highways Committee recommends that Major P. CROOM-JOHNSON, A.M.Inst.C.E., M.I.M.C.E., assistant permanent-way engineer in the tramways department, be promoted to the position of permanent-way engineer at a salary of £800 rising to £1,000 a year (based on pre-war conditions).

The East Ham Town Council has increased the salary of Mr. W. R. ELLIOTT, electrical engineer and tramway manager, from £650 to £700 per annum as from last July, with annual increments of £50 to a maximum of £800, plus bonus.

On the occasion of the annual outing of Engineering Supplies, Ltd., which took place on June 20th, the employés were the guests of the chairman, Mr. J. Shaw Robertson, at his residence, "The Vache," Chalfont-St.-Giles. At luncheon the managing director (Mr. H. A. DORMER) was presented with a silver salver, bearing the names of the employés, as a token of regard upon his completion of 21 years' service with the company.

MR. F. C. RAPHAEL, M.I.E.E., consulting electrical engineer, has moved from 19, Ludgate Hill to 24 to 27, High Holborn. ("Chancery 7961.")

On June 8th, a farewell dinner was given to the staff of the Richmond Electric Light and Power Co., Ltd., by Mr. H. G. ALGER, who is relinquishing the position of manager of the undertaking to take up a position at Bournemouth. During the evening presentations of a barometer and a silver cigarette box were made by the staff, and Mrs. Alger was given a cut-glass rose bowl. Mr. Alger, in acknowledging the gifts, expressed his appreciation of the support which the staff had given him during his 17 years at Richmond. Mr. A. B. Meadows proposed the health of the host and hostess, and said that the smooth working of the undertaking was solely due to Mr. Alger's unselfish consideration for his staff.

Obituary.—MR. S. MECHAN.—The death occurred on June 9th of Mr. Samuel Mechan, joint managing director of Messrs. Mechans, Ltd., of Glasgow.

MR. W. C. HAWKINS.—The death is reported of Mr. William Clark Hawkins, managing director of the Dominion Power and Transmission Co. and its 14 subsidiaries.

MR. M. W. W. MACKIE.—We regret to record that Mr. Matthew William Walbank Mackie (Messrs. W. Mackie & Co.), passed away on June 19th in his seventieth year at his home at Surbiton, after about a month's illness. Mr. Mackie was one of the very early workers in connection with British electrical engineering affairs, for he had been directly engaged therein for more than 45 years. From the year 1880 to 1883 he was employed as electrical engineer by the British Electric Light Co., Ltd., supervising during that period the erection of some of the earliest electric light installations, notably those at the Crystal Palace Exhibition and the Paris International Exhibition. Between 1883 and 1885 Mr. Mackie was engaged in business in Bermondsey, chiefly in the manufacture of electric incandescent lamps. He commenced business operations in Turnmill Street, in 1885, chiefly in the manufacture of dynamos and motors of large sizes, having customers among the principal London newspapers and other large users of electricity who had their own plants. He continued there until the year 1900, when operations were transferred to Golden Lane, from where he carried out several large lighting installations for country houses, supplying entire plants. From 1907 until 1914 he was engaged at 47½, Old Street in the manufacture of wireless apparatus for the Marconi Co. and various Government offices. In 1914 Mr. Mackie built the Palace Engineering Works at 129-133, Lambeth Road. Here during the war Messrs. W. Mackie & Co. carried out large contracts for the Admiralty and the War Office, afterwards concentrating their energies on wireless apparatus. Mr. Mackie invented several devices for the improvement of this interesting and important branch of electrical work.

Wills.—The late Mr. Godfrey Isaacs left £195,490 gross and £139,428 net personalty.

SIR DAVID SALOMONS left unsettled property of the gross value of £388,412, with net personalty £332,538.

New Companies Registered.

Collier & Illingworth, Ltd. (206,593).—Private company. Registered June 12th. Capital, £1,000 in £1 shares. Objects: To acquire the business of an electrician and mechanic now carried on in Southport, Lancs., by W. E. Illingworth. The permanent directors are:—R. R. Rimmer, 23a, Manchester Road, Southport; A. E. Collier, 4, Chambers Road North, Southport; W. E. Illingworth, 4, Marine Drive, Ainsdale. Remuneration as fixed by the company. Solicitor: W. Hodge, 18, Hoghton Street, Southport.

Acrophone, Ltd. (206,537).—Private company. Registered June 10th. Capital, £1,500 in 100 founders' shares of 1s. and 1,495 preference shares of £1. Objects: To acquire the business of a manufacturer of wireless sets, loud speakers, and parts and accessories thereof, carried on by A. H. Watkins at Graiseley Works, Church Lane, Wolverhampton, as the "Acrophone Company," together with the registered trade mark "Acrophone." The first directors are:—F. H. Parkyn, J.P., Spring Head, Sedgley, Staffs. (director of Walters Gear Case Components Co., Ltd.); A. H. Watkins, The Hut, Beckbury, near Shifnal, Salop, chartered patent agent (both permanent). Qualification of permanent directors, 200 shares; of ordinary directors, £100. Secretary: A. W. Rogers, Haslemere, Hughe Avenue, Wolverhampton. Registered office: Graiseley Works, Church Lane, Wolverhampton.

R. F. Winder, Ltd. (206,640).—Private company. Registered June 15th. Capital, £12,000 in £1 shares. Objects: To carry on the business of electrical engineers and contractors, machinery merchants, cable manufacturers, wire drawers, accumulator makers, scientific instrument and radio goods manufacturers, &c. The first directors are:—R. F. Winder, Parkfield, Newton Road, Leeds, electrical engineer (permanent governing director and chairman); R. Winder, Parkfield, Newton Road, Leeds, electrical contractor; and C. E. Winder, Parkfield, Newton Road, Leeds, electrical contractor. Qualification of R. F. Winder, 1 share. Secretary: E. P. Robson.

Thalberg Halstead, Ltd. (206,687).—Private company. Registered June 17th. Capital, £1,000 in £1 shares. Objects: To acquire the business of an electrical and radio engineer and manufacturer of and dealer in mechanical, electrical, optical, photographic and radio instruments, now carried on by T. Halstead at 48, Cookson Street, Blackpool. The first directors are:—T. Halstead (chairman), Briar Royd, Briar Lane, Thornton-le-Fylde; and C. H. Scholes, "Rossendale," Rossendale Avenue, Thornton-le-Fylde (both permanent, subject to each holding 200 ordinary shares). Solicitor: H. O. Whiteside, 36, Birley Street, Blackpool.

Tudoradio Co., Ltd. (206,644).—Private company. Registered June 15th. Capital, £2,000 in £1 shares (1,000 7 per cent. cumulative preference and 1,000 ordinary). Objects: To adopt an agreement with O. C. Morison for, *inter alia*, the acquisition of the trade mark "Tudoradio," No. 444,518, and to manufacture and deal in all kinds of radio apparatus. The first directors are:—O. C. Morison, The Beeches, Cowley, Middlesex, engineer; Edna D'Butto Evans, 4, Font Street, W.; and H. C. Cleaver, address not stated. Qualification, £10. Remuneration as fixed by the company. Secretary: Miss C. J. Carlisle, Tudor Works, Park Royal, Willesden, N.W.10. Solicitors: Warwick Webb, Son & Co., 37 and 39, Essex Street, W.C.

P.I.V. Chain Co., Ltd. (206,639). — Registered as a "public" company on June 15th with a nominal capital of £50,750 in 50,000 preference shares of £1 and 15,000 ordinary shares of 1s. each. Objects: To acquire a licence to manufacture and sell a combination of inventions called the "P.I.V. chain" under the patents granted and to be granted for Great Britain, the Irish Free State, Northern Ireland and the Isle of Man; to adopt an agreement with the P.I.V. Gear Syndicate, Ltd., and to carry on the business of manufacturers and vendors of and dealers in machinery and plant used in connection with motive power of any kind, and machinery, plant, dynamos, accumulators, apparatus, parts, accessories, appliances, tools and fittings, used in connection with machinery of any variety, mechanical and electrical engineers, machinists, electricians, carriage and chassis builders, &c. The minimum cash subscription is 7 shares. The subscribers (each signing for one ordinary share) are:—R. W. King, 31, Elmhurst Road, Forest Gate, E., secretary; J. A. Robertson, 131, Westbourne Terrace, W.2, merchant; H. l'Anson Jones, Dunolly, Gerrards Cross, solicitor; and four clerks. The subscribers are to appoint the first directors. Qualification, £100. Solicitors: Slaughter & May, 18, Austin Friars, E.C. The registered office is at Basildon House, Moorgate, E.C.

Municipal Appliances, Ltd. (206,679).—Private company. Registered June 17th. Capital, £1,000 in £1 shares. To carry on the business of wholesale and retail import and export merchants and owners and manufacturers of motor vehicles and other conveyances, manufacturers of and dealers in trucks, locomotives, accumulators, dynamos, engineering supplies, radio sets and parts, &c. The directors are:—C. S. Green, 5, Kewferry Road, Northwood, Middlesex (managing director of Green & Edwards, Ltd.); and G. F. Guinness, 42, Greenstead Avenue, Woodford Green, Essex. Remuneration as fixed by the company. Solicitors: Julius White & Bywaters, Stevenage House, 40-44, Holborn Viaduct, E.C.1. Registered office: 8, Great Russell Street, Bloomsbury, W.C.2.

Official Returns of Electrical Companies.

W. R. Thornton & Son, Ltd. — W. H. Vale, of Duke Street, Barrow-in-Furness, C.A., was appointed receiver and manager on May 27th, 1925, under powers contained in first mortgage debenture dated November 1st, 1924.

Rushden and District Electric Supply Co., Ltd.—Particulars filed of £50,000 debenture stock authorised May 12th and covered by trust deed dated May 2th, 1925, charged on the company's undertaking and property, present and future, including uncalled capital, of which none has at present been issued. Trustees: Sir Arthur R. de Capell Brooke, Bt., J. Pendered, and S. H. S. Cook.

Simmonds & Stokes, Ltd. — Particulars filed of £2,000 second debentures authorised April 21st, 1925, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £350.

Issue on June 4th, 1925, of £150 debentures, part of a series already registered.

Greenwich Cable Works, Ltd.—Satisfaction in full on June 10th, 1925, of debentures dated March 24th, 1920, securing £25,000.

L. Adams, Ltd. — Debenture dated June 11th, 1925, to secure £250, charged on the company's property, present and future, including uncalled capital. Holder: P. Riess, 10, Middleton Road, Golders Green, N.W.

City Notes.

Whitehall Electric Investments, Ltd.

The Hon. Clive Pearson presided at the annual meeting on June 18th, and in presenting the report and accounts, which were reviewed in our last issue (p. 989), said that the lighting and power business of the Cia. Chilena had developed rapidly and the use of electricity in the area served was still expanding so quickly that the development of further power resources would have to be undertaken before long. The electrified portion of the State railways, the section from Santiago to Valparaiso, provided a good load, and the Chilean Transandine Railway Co. would soon become a customer for power for its electrified line. Since August last a bulk supply had been furnished to the Cia. de Electricidad de Valparaiso. The Santiago Tramways' earnings had again been low owing to the low exchange value of the peso and to the inadequacy of the tariff. Permission had now been received for the doubling of the fares, the company undertaking to carry out certain improvements. The lighting and power system was being transferred to a new company, the whole of whose shares would be held by the Cia. Chilena. The latter company had recently acquired a controlling interest in the electrical undertaking of San Antonio, south of Valparaiso, where there was promise of an increasing trade. As regarded the Valparaiso company, while the light and power business was expanding normally, the tramways were seriously affected by motor omnibus competition. A strike of the employés of the Tampico company and of those of one of its largest customers resulted in a heavy loss of revenue. During the current year the earnings had been satisfactory. The Vera Cruz Company also suffered on account of labour troubles, but this company too had since shown an improvement. The Puebla Company

continued to make steady progress, and the Orizaba and Cordoba companies operated normally during the year. With the advent of a new Government in Mexico a feeling of optimism was created; so far as the company's interests were concerned there had been a decided improvement. The general prospects of the concerns in which the company was interested were regarded as satisfactory.

General Electric Co., Ltd.

The report for the year ended March 31st last shows a net profit of £1,029,983, and the addition of £212,452 brought forward makes available £1,242,435. Debenture interest absorbs £238,528; depreciation £191,320; pension fund, £15,546; preference dividends, £252,000; and reserve £172,387, leaving £372,654. It is proposed to pay a dividend of 7½ per cent. on the ordinary shares, as against 5 per cent. in 1923-24, leaving £214,256 to be carried forward. A successful year's trading is reported, the net profit showing an increase of £194,422. The company's works were fully employed. In heavy engineering, the inflow of orders was satisfactory, but the profits were small in proportion to the technical skill and risk involved. The demand in the Home market for the company's products—telephone and radio apparatus, lamps, switchgear, cables and general electrical commodities—showed a steady increase. Of the company's oversea branches, Australia, and, to a smaller degree, South Africa, showed definite improvement. In China Argentina, and India, local conditions continued to make business extremely difficult. The company's liquid resources show an increase of some £587,000, and amounted at March 31st to £2,205,000. The increase is largely due to the recovery of a pre-war debt, which has at the same time strengthened the reserve account. The directors have applied this amount, together with a portion of the trading profits, to writing off from the balance sheet the two nominal assets—"Premium on purchase of Fraser & Chalmers, £110,000," and "Expenses of issue of mortgage debenture stock, £109,404." The reserve account will then stand at the increased figure of £710,000. The expansion of business again enabled the company to provide additional employment, the number of its employés now amounting to over 18,000. Mr. L. C. Gamage has been appointed to the board. Meeting: July 8th.

British Empire Trust Co., Ltd.

The annual meeting was held on June 15th, when Mr. J. Davidson (deputy-chairman and managing director) presided in the absence of the chairman Mr. R. M. Horne-Payne, and read an address prepared by the latter. This address reviewed the results of working of the companies with which the Trust Company is connected. It was stated that the British Columbia Electric Railway Co. continued to show satisfactory progress in every department, and that progress was being continued during the current year. On the other hand, the year 1924 did not prove so favourable to the Canadian Western Lumber Co., Ltd. With regard to the Winnipeg Electric Railway Co., the conversion of the 4½ per cent. debenture stock to 5 per cent. 30-year refunding stock had been agreed to. A dividend of 1 per cent. had been paid on the ordinary shares, and provision had been made for extensions for the next two years. Although the dull conditions continued during 1924, the present tendency was towards improvement. The Canadian Northern Prairie Lands Co., Ltd., was in a strong position, and the Canadian Western Natural Gas Light, Heat and Power Co., Ltd., continued to show satisfactory results. The political conditions in Mexico again had an adverse effect upon the business of the Monterey Railway, Light and Power Co., but the company had been able to provide for the 5 per cent. debenture interest and sinking fund. Referring to the West Gloucestershire Power Co., Ltd., the address stated that progress was being made with the laying of service lines. Much was being said at present of electricity schemes aided by legislation; if such encouragement were given on an economic basis, unaccompanied by vexatious restrictions, good would doubtless result. The payment of the following dividends was approved:—5 per cent. on the cumulative perpetual preference shares; 8 per cent. on the employés' profit participating shares; 5 per cent. on the preferred ordinary shares; and 7 per cent. on the deferred ordinary shares.

Oriental Telephone and Electric Co., Ltd.

Sir George Gibb (chairman) presided at the annual meeting on June 19th, and in presenting the report and accounts (*vide* our last issue, p. 988) said that the decrease in the gross revenues was due to the fact that the Rangoon undertaking was separately operated during the past year, a dividend of 10 per cent. having been received. The company had received a full year's preference dividend from the Bengal Telephone Corporation and 3 per cent. on the ordinary shares, as compared with nothing in 1923. It was considered that the reserve for depreciation (£50,000) was quite adequate for the present. Their interests in India and elsewhere in the East were steadily growing, and large capital expenditure had been incurred. The recent growth in the number of subscribers, especially at Bombay and Calcutta, had been disappointing, but this was to be attributed to the imposition in 1922 of heavier rates than the traffic would bear and to the retention of the antiquated flat-rate system. The company thus suffered a double loss in its revenue; the loss from the insufficiency of the payment by the large users and that from the restriction of the growth in the number of subscribers. In Calcutta message rates had been introduced with success, and the Bombay Co. had asked for sanction to do the same. The chairman hoped, therefore, that that adverse factor would soon be removed. The Bombay company would have to labour for some years under the heavy charges on a recent debenture issue, and it would not recover from its depressed condition until message rates were adopted. The Singapore undertaking was taking steps to secure sanction to the message rate system of charging. As stated in the report, the Hong-Kong undertaking was being transferred to a new company, and the prospects were considered favourable. It had been decided to make a distribution of £8,000 among the Hong-Kong staff in lieu of pensions; the pensions scheme of the Oriental Company was still under consideration, and he hoped to be able to submit proposals at the next meeting. During a discussion which followed the chairman's speech, it was suggested that the proposed grant to the Hong-Kong staff should be postponed and the matter considered in conjunction with the Oriental Company's pension scheme. This was agreed to.

United Electric Tramways of Montevideo, Ltd.

The annual meeting was held on June 18th, Mr. G. Balfour, M.P., presiding, in the absence, through illness, of Sir George Touche. In moving the adoption of the report and accounts (*vide* our last issue, p. 988), the chairman said that the gross receipts had increased by £30,587, but at the same time the expenses had risen by £28,532, owing to the higher cost of fuel, increased taxation, and higher wages. The increased wages had been paid for the whole year at the request of the Court pending the settlement of the company's claim against the Municipality. It was expected that judgment would be delivered early next year in the suit brought against the municipality by the tramway companies for its illegal intervention in January, 1922. During the year additional plant and rolling stock had been ordered to meet the increasing traffic and an issue of £150,000 seven per cent. five-year notes had been made to provide the necessary funds. The Bill, which would permit the company to increase its tariffs, was still in abeyance in the Senate. The chairman showed the need for this by stating that only two dividends had been paid on the ordinary shares—7 per cent. in all—making the average return less than three-quarters of one per cent. This was due to the burden of high wages combined with the inability to charge a higher tariff to meet the increased charges which were one of the results of the war. There were, however, indications that the hostility to foreign investors which had been prevalent in Uruguay was giving place to a spirit of co-operation.

Burndept Wireless, Ltd.

The statutory general meeting of this newly-formed company was held on June 19th, Lord Lurgan, K.C.V.O., presiding. The chairman stated that the business was making satisfactory progress, and the main factories at Blackheath were working full time on current orders and for stock. The old Blackheath factory was to be extended, and the company had purchased freehold factories at Willesden to enable it to carry out further developments. A portion of these premises had been leased to the associated company, Radio Accessories, Ltd., which was to produce, among other components, receiving and transmitting valves. The company had also set up its own cabinet-making shops. As regarded the selling policy, the company had acquired the business of four of the old company's principal agents in the provinces; these had been converted into direct branches of the company.

Provincial Tramways Co., Ltd.

The recently-issued report covers a period of 16 months ended December 31st, 1924, and the accounts include the results of the Gosport and Alverstoke Electric Lighting Co. for the years 1923 and 1924. The credit balance is £21,070 (including £3,435 brought forward, and waived directors' fees amounting to £600). Debenture interest absorbs £10,937, depreciation £3,340, and general reserve £1,933, leaving £4,587 to be carried forward. It is stated that improvements have been carried out in the Portsmouth district to meet omnibus competition, and that the sale of the Grimsby undertaking will necessitate a large increase in net revenue to offset this loss of revenue. The directors have decided not to recommend the payment of any of the arrears since September, 1922, on the cumulative preference shares.

New Issue.—*Rushden & District Electric Supply Co., Ltd.*—The list opened on June 16th and was to close on or before the 24th in an issue of £25,000 of 5 per cent. debenture stock at £95 per cent. This is part of an authorised issue of £50,000, and is to be repaid at par on July 1st, 1965, or after July 1st, 1935, at any time in the discretion of the company at £102 10s. per cent. The proceeds of the issue will be devoted to the repayment of a bank loan and for the purposes of extensions.

Kaministiquia Power Co. — The common shares are to receive a dividend of $2 for the quarter ending July 31st.

James Keith & Blackman Co., Ltd.—The report for the past year records a greater volume of business. The available balance, after meeting debenture interest, preference dividends, &c., is £31,638. A dividend of 10 per cent. on the ordinary shares is recommended and it is proposed to transfer £5,000 to reserve and carry forward £11,138. The meeting is to be held to-day (Friday).

Stock Exchange Notices.—Application has been made to the Committee to allow the following to be officially quoted :—

Clyde Valley Electrical Power Co.—600,000 ordinary shares of £1 each, 10s. paid, Nos. 600,001 to 1,200,000.

The undermentioned have been ordered to be officially quoted :—

International Telephone and Telegraph Corporation.—$20,115,200 capital stock in shares of $100 each.

Isle of Thanet Electric Supply Co., Ltd.—150,000 ordinary shares of £1 each, fully paid, Nos. 1 to 150,000.

Marconi's Wireless Telegraph Co., Ltd.—500,000 ordinary shares of £1 each, fully paid, Nos. 3,500,001 to 4,000,000.

Dealings in the following have been specially allowed by the Committee under Rule 159 :—

Ever-Ready Co. (Great Britain).—34,108 new 7 per cent. cumulative preference shares of £1 each, issued at £1 1s. 6d. per share, partly paid and fully paid, Nos. 165,893 to 200,000.

North of Scotland Electric Light and Power Co., Ltd.—The directors in their report for the past year state that, after making provision for income tax and reserve for renewal of plant, meeting debenture and loan interest and the preference share dividend, and adding the amount brought forward, there remains a balance on the net revenue account of £12,150. An interim dividend of 3 per cent., free of tax, on the ordinary shares was paid in October last, and the directors recommend a further dividend of 4 per cent., free of tax, that £7,500 be placed to general reserve, and that the balance of £1,150 be carried forward.

Waygood-Otis, Ltd.—The accounts for the year ended March 31st last show a profit of £59,761, to which is added £14,187 brought forward, making £73,948. After paying the preference and interim dividends, and transferring £20,000 to reserve and £6,000 to the pensions fund, there remains a balance of £31,698. It is proposed to pay a final dividend of 5½ per cent. on the ordinary shares (making 8 per cent. for the year, as before) and to carry forward £15,748. The report states that £61,835 had been transferred from the reserve to write down the balance standing to the debit of goodwill and patents to £60,000.

Brazilian Traction, Light & Power Co.—The receipts for 1924 rose from $7,510,459 to $8,249,520, and the net profit from $6,929,965 to $7,638,917. The ordinary dividend was again 4 per cent., and a balance of $2,776,129 (as against $2,067,488) is carried forward. The gross and net earnings of the subsidiary companies showed a substantial improvement. The loss incurred by the company during the Sao Paulo revolt in 1924 has been assessed at $700,000, and it is hoped that the Government will take the necessary steps towards paying this compensation to the company.

Cape Electric Tramways, Ltd. — At a meeting held on June 17th, the holders of the company's 5 per cent. first mortgage debenture stock agreed to the following proposals relating to this stock :—To extend the time for redemption to July 1st 1935; to increase the rate of interest to 6 per cent.; to pay off the debentures at £103 per cent. by means of ten annual drawings commencing next year; and to give the company the option of redeeming the whole of the debentures at any time at the rate of £106 per cent.

Ransomes, Sims & Jefferies, Ltd. — The directors report that the company's business has improved in spite of the generally unfavourable conditions, but competition is severe. The profit for the past year, after providing for debenture interest, &c., was £60,625, and the addition of £64,505 brought forward makes £125,130. The preference dividend is to be paid, but no distribution is recommended on the ordinary shares. The reserve receives £30,000 and £56,630 is carried forward

County of London Electric Supply Co., Ltd.—An extraordinary general meeting has been called for June 29th to consider proposals for raising the capital from three to seven million pounds by the creation of 2,000,000 6 per cent. preference shares and an equal number of ordinary shares of £1 each; and authorising the directors to borrow up to £4,000,000 or the amount of issued capital, whichever is the greater.

Callender's Cable and Construction Co., Ltd.—At a recent extraordinary meeting of the shareholders the increasing of the capital to £1,500,000 by the creation of 200,000 new ordinary shares of £1 each, to rank with the existing ordinary capital, was approved.

Kalgoorlie Electric Power & Lighting Corporation, Ltd.—Interest at the rate of 6 per cent. is to be paid on the debenture stock on July 2nd, in respect of 1924.

Chili Telephone Co., Ltd.—A final dividend of 2s. per share, free of tax, is recommended, making 5s. per share, tax free, for the year ended March 31st last.

Eastern Extension, Australasia, and China Telegraph Co., Ltd. An interim dividend of 2½ per cent., free of tax, has been declared.

Parsons' Foreign Patents Co.—The Court has sanctioned the reduction of the company's capital to £45,000 by the repayment of 5s. per existing £1 share.

Montreal Light, Heat & Power Consolidated.—A dividend of $2 per common share has been declared for the quarter ending July 31st.

Stocks and Shares.

MONDAY EVENING.

THE Stock Exchange markets have been upset by a variety of causes, amongst which one of the chief is the apprehension of money becoming quite considerably dearer in the near future. Rumour talks about a possible 6 per cent. Bank Rate, and, going still farther, thinks that it may be raised on to a higher platform than this. The incessant outpouring of new stocks, the end of the half-year money requirements, the disturbances which still exist by reason of the recent change-over to a gold standard, contribute to the common fund of restlessness caused in the financial world by, amongst other things, the political upheavals in China, the troubles in the mining industry at home, and the incessant realisation of stocks by industrial companies that are doing badly at the present time, and have to draw upon their reserves in order to meet current charges.

The Stock Exchange markets have enjoyed several months of good prices. Most prices have been on the rise. The public have bought probably as much as was good for them; in some cases, appreciably more. It is not surprising that there should be a halt called, especially in view of the fact that the Government is authorising a Trades Facilities issue of Synthetic Ammonia 5 per cent. debenture stock, with security practically identical to that of the 5 per cent. War Loan, at the price of 98 per cent.

The County of London Electric Supply Company has convened a meeting, to be held next Monday, for passing resolutions that will raise the capital of the company from three million pounds to seven million pounds, by the creation of ordinary and preference shares. Part, no doubt, of the new capital will be required in connection with the Barking station. Moreover, the company's one-year debenture issue falls due to be repaid shortly, and in any case, re-financing will soon be necessary. The directors are right in taking powers to increase the capital to a substantial extent, though it will not be necessary, in all probability, to call up anything like the full amount of money for which permission is to be obtained. The price of the shares is unchanged at 55s. 9d. Midland Counties are 6d. down at 23s. 9d. The company's new issue of preference shares is quoted at a premium of about twopence. Urban ordinary recovered to 17s., a rise of 1s. 3d., and most of the shares in the list are steady, showing no further changes than those just mentioned. Clyde Valley second preference hardened to 28s.

The Home Railway market, after being surprisingly good in the section for steam stocks, reacted a little from the top in sympathy with the fall in gilt-edged securities. The previous advance was explained by reference to the fact that the fall had proceeded too far, and that investment recognised the possibility of improvement which the stocks presented after their long decline. The observer may doubt, however, whether there is much real strength in the market as a whole. The outbreak of fresh trouble in the mining industry leads to the impression that traffics may not revive as they are expected to do in the second six months of the present year. Amongst the electric stocks, Metropolitans are a point down at 71, while the Undergrounds have not moved.

Cable stocks and shares show unimportant, irregular changes. Great Northerns parted with 10s. of their last week's gain of 30s. Western Telegraphs are weaker and Anglo-American deferred is ¼ down. A fall of similar amount in Chile Telephones followed the dividend declaration of 2s. net, making 5s. free of tax for the year. Last year, the full dividend was 6s., but the capital has been substantially augmented in the meantime. New shares now rank equally with the old. The price marked 5⅞ to-day, Monday. Automatic Telephones keep good at 2½.

Marconis, nominally unchanged at 31s. 3d., are sellers at that price. Canadian Marconis remain at 4s. 6d. Radio Common are 10¼, a point higher than the preferred.

Callenders, at 2 15/16, are ex rights and as the new shares stand at 6s. 3d., the paper reduction of 5/16 in the price of the old is thus accounted for. Siemens weakened to 26s. 3d. General Electrics rose to 26s., to revert to 25s. 6d. upon announcement of a dividend of 7½ per cent., against 5 per cent. a year ago. The result of the year's trading is regarded in the market as being satisfactory. It is in accordance with the more cautious of the estimates that were current in advance. Henleys are a little easier at £3. Whitehall Electric debenture shed a point, to 97½. In other foreign descriptions, Argentine, Light & Power gave way a trifle to 11s. 6d.

Brazilian Tractions maintain their advance to 57. The company's report, out at the end of last week, met with approval. Evidently the company is going ahead. When the rate of exchange becomes still more favourable, the Brazilian Traction Company should do exceedingly well. Rio Tramways Fives advanced to 94½. Mexico Trams are still heavy.

British Electric Traction ordinary continues to advance, the price being another point higher at 119.

Engineering and similar shares exhibit a hesitating tendency in consequence of the conditions that have developed this week in the coal trade. The rubber share market keeps up its end with noticeable strength although business is quieter, for which the reason has to be sought in the heavy tone which overshadows as a whole the Stock Exchange markets, due to the political and monetary apprehensions already noticed.

Share List of Electrical Companies.

HOME ELECTRICITY COMPANIES.

	Nom. £	Dividend. 1923.	1924.	Price June 22, 1925.	Rise or fall.	Yield. p.c.
Bournemouth and Poole ...	1	13	14	29½	—	5 1 10
Brompton Ordinary	1	10	10	12½	—	*5 14 8
Charing Cross Ordinary	1	14½	15	46/9	—	6 8 2
do. do. do. 4½ Pref.	1	4½	4½	17/6	—	5 2 10
Chelsea	1	12	12	17½	—	6 8 0
City of London	1	15	15	48/3	—	6 4 3
do. do. 6% Pref. ...	1	6	6	23/6	—	5 2 2
Clyde Valley	1	8	8	32/6	—	4 18 6
County of London	1	15	15	55/9	—	5 7 6
do. do. 6% Pref. ...	1	6	6	25/-	—	5 4 4
Edmundson's Ordinary	1	7	—	21/-	—	6 1 9
do. 7% Pref.	1	6	7	22/-	—	6 7 3
Elec. Supply Corporation ...		10	10	33/3	—	6 0 4
Kensington Ordinary	5	14	15	12¾	—	5 16 6
Lancs. Light and Power ...	1	7½	7½	27/-	—	5 11 1
London Electric	1	10	10	35/-	—	5 14 1
do. do. 6% Pref. ...	5	6	6	6¾	—	5 6 8
Metropolitan	1	10	11	38/3	—	5 15 9
do. 4½% Pref.	1	4½	4½	17/6	—	5 2 10
Midland Counties	1	5½	6	23/9	– 6d.	5 1 1
Newcastle-on-Tyne Ordinary ...	1	6	7	22/-	—	6 7 3
do. 5% Pref. ...	1	5	5	18/9	—	5 6 8
do. 7% Pref. ...	1	7	7	25/-	—	5 12 0
Notting Hill 6% Pref.	10	6	6	10	—	6 0 0
North Met. Elec. 6% Pref. ...	1	6	6	1¼	—	5 6 8
St. James' and Pall Mall ...	5	17½	17½	13¾	—	6 7 3
South London	1	15	15	2⅞	—	6 3 1
South Metropolitan Pref. ...		7	7	1½	—	5 12 0
Urban Ordinary	1	4	4	17/-	+ ½	4 14 2
do. 6% Pref. ...	1	6	6	20/-	—	6 0 0
Westminster Ordinary	1	15	15	46/6	—	6 — 0
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	1	—	7 10 0
Yorkshire Elec.	1	8	8	31/-	—	5 3 3

HOME RAILS.

Central London Ord. Assented	Stock	4	4	69	—	5 15 11
Metropolitan	,,	4	5	71	– 1	7 0 10
do. District	,,	9½	8½	48½	—	7 4 4
Underground Electric Ordinary	10	Nil	Nil	2¾	—	Nil
do. do. "A" ...	1/-	Nil	Nil	3/-	—	Nil
do. do. Income	Bonds	6	6	98	—	*6 2 5

TELEGRAPHS AND TELEPHONES.

		Dividend. 1922.	1923.				
Anglo-Am. Tel. Pref.	Stock	6	6	105	—	5 14 8
do. Def.	,,	1½	1½	24½	— ½	6 3 9
Automatic Telephone	1	Nil	3	2½	—	2 18 1
Chili Telephone	5	6	6	6⅛	— ½	*5 10 4
Cuba Sub. Ord.	10	7	5	6¼	+ ½	*7 5 6
Eastern Extension	10	10	10	17½	—	*5 15 1
Eastern Tel. Ord.	Stock	10	10	176½	—	*5 14 0
Globe Tel. and T. Ord.	10	10	10	17½	—	*5 12 11
do. do. Pref. ...	10	6	6	11¼	—	5 7 10
Great Northern Tel.	10	24	22	33½	— ½	6 15 4
Indo-European	25	7	7	41½	—	*4 4 4
Marconi	1	15	10	1⅞	—	6 5 0
Marconi Marine	1	10	10	1	—	10 0 0
Oriental Telephone Ord. ...	1	12	12	9¾	—	*5 9 7
United R. Plate Tel.	5	8	8	6½xd	+ ⅛	*5 15 4
Western Telegraph	10	10	10	16¾	— ½	*6 2 2

HOME AND FOREIGN TRAMS, &c.

Anglo-Arg. Trams First Pref. ...	5	12½	5½	8⅞	—	8 6 6
do. do. 2nd Pref. ...	5	6½	6	8	—	10 0 0
do. do. 5% Deb. ...	Stock	5	5	74	—	6 15 2
British Electric Traction Ord. ...	,,	5	6	119	+1	5 0 10
do. do. 6% Pref. ...	,,	6	6	110½	—	5 9 7
Brazil Traction	100	4	4	57	—	7 0 4
Brit. Columbia Elec. Rly. Pcc.	Stock	5	5	80½	—	5 11
do. do. Preferred	,,	5	80/-	83½	—	*5 10 10
do. do. Deferred	,,	9	129/5	108½	—	*6 1 6
do. do. Deb.	,,	4½	4½	77½	—	5 9 8
Lond. & Sub. Trac. 5% Pref. ...	1	5	2½	6/-	—	Nil
London United Tram. Deb. ...	Stock	4	4	47¾	—	8 8 5
Mexico Trams, 5% Bonds ...	—	Nil	5	63½	–1	8 0 0
Mexican Light Common ...	100	Nil	Nil	25	—	Nil
do. Pref.	100	Nil	Nil	61	—	Nil
do. 1st Bonds ...	—	5	5	65¾	—	7 10 5
Yorkshire (West Riding) ...	1	—	5	18/9	—	5 6 8

MANUFACTURING COMPANIES.

Babcock & Wilcox	1	20	12	2⅝	—	*4 13 7
British Aluminium Ord.	1	5	5	31/3	—	3 4 0
British Elec. Transformer Pref.	1	Nil	Nil	17/6	—	... ...
British Insulated Ord.	1	15	15	8½	—	4 10 8
Brush Ord.	1	10	10	1	— ⅛	10 0 0
Callenders	1	15	15	2⅛xr	—	5 2 0
do. 6½% Pref.	1	6½	6½	23/9	—	5 9 5
Crompton Ord	1	5	Nil	2	—	... ...
Edison-Swan	4/-	7½	10	8/-	—	5 0 0
do. 5% Deb.	Stock	5	5	81½	—	6 1 3
Electric Construction	1	10	10	1¾	—	6 3 1
Enfield Cable, Pref.	1	7½	7½	1¼	—	6 0 0
English Electric	1	8	5	18/9	—	5 6 8
do. do. Pref.	1	6	6	21/-	—	5 14 3
Gen. Elec. Pref.	1	6½	6½	23/6xd	—	5 10 8
do. Ord.	1	5	5	25/6	—	3 17 8
Henley	1	15	15	3	— ⅛	5 0 0
do. 4½% Pref.	5	4½	4½	4½	—	5 6 0
India-Rubber	1	10	5	1	— ⅛	*5 0 0
Johnson & Phillips	1	5	10	2⅛	+ ⅛	4 17 0
Met-Vickers, Ord....	1	12½	8	23/3	—	6 17 8
do. Pref...	2	8	8	2⅜	—	6 14 9
Siemens Ord.	1	5	—	26/3	–9d.	*5 14 3
Telegraph Construction	12	20	10	27	—	4 9 0

* Dividends paid free of Income Tax.

Market Quotations for Chemicals and Metals.

IT should be remembered, in making use of the figures appearing in the following list, that in some cases the prices are only general and they may vary according to quantities and other circumstances.

CHEMICALS, &c.	Price June 23.	Fortnight's Inc. or dec.
a Acid, Oxalic ... ... per lb.	5¾d.	...
a Ammoniac, Sal ... ... per ton	£60	...
a Ammonia, Muriate (large crystal) ,,	£52	...
a Bisulphide of Carbon ... ... ,,	...	...
a Borax ... ... ,,	£25	...
a Copper Sulphate ... ... ,,	£25 10s.	...
a Potash, Chlorate ... ... per lb.	4d. to 4½d.	...
a ,, Perchlorate ... ... ,,	5½d.	...
a Shellac ... ... per cwt.	£15 15s.	...
a Sulphur, Sublimed Flowers ... ,,	£7 15s.	...
a ,, Roll ... ... ,,	£7 15s.	...
a Soda, Chlorate ... ... per lb.	3¼d. to 3½d.	...
a ,, Crystals ... ... per ton	£5 to £5 5s.	...
a Sodium Bichromate, casks ... per lb.	4d.	...
METALS, &c.		
b Aluminium, Ingots ... ... per ton	£120 to £125	...
b ,, Wire ... ... per lb.	1/9 to 2/6*	...
b ,, Sheet ... ... ,,	1/6 to 2/-	...
p Babbitt's Metal and Anti-friction Metal—		
Grade I ... ... per ton net	£229	£1 dec.
Grade II ... ... ,, ,,	£163	£1 dec.
Grade III ... ... ,, ,,	£91	£1 dec.
c Brass (rolled metal 3' to 12' basis) per lb.	9¾d.	...
c ,, Tubes (solid drawn) ... ,,	11¾d. to 1/-	...
c ,, Wire, basis ... ... ,,	9¾d.	...
c Copper Tubes (solid drawn) ... ,,	1/1	...
c ,, Bars (best selected) ... per ton	£90	...
c ,, Sheet ... ... ,,	£90	...
c ,, Rod ... ... ,,	£90	...
d ,, (Electrolytic) Bars ... ,,	£63 17s. 6d.	7s. 6d. inc.
d ,, ,, Sheets ... ,,	£148 10s.	...
d ,, ,, Wire Rods ... ,,	£73 17s. 6d.	7s. 6d. inc.
d ,, ,, H.C. Wire per lb.	9 1/16d.	1/16d. inc.
f Ebonite Rod ... ... ,,	2/- to 3/6	...
f ,, Sheet ... ... ,,	2/- to 3/6	...
g German Silver Wire ... ... ,,	2/3	...
h Gutta-percha, fine ... ... ,,	8/3	...
h India-rubber, Para fine ... ... ,,	2/7	3d. inc.
i Iron Pig (Cleveland Warrants) ... per ton.	nom.	...
i ,, Wire, galv. No. 8, P.O. qual. ,,	£23	...
g Lead, English Pig ... ... ,,	£34 15s.	10s. dec.
g Mercury ... ... per bot.	£13 15s. to £14	...
e Mica (in original cases) small ... per lb.	3d. to 8/-	...
e ,, ,, medium ... ,,	4/- to 8/-	...
e ,, ,, large ... ... ,,	10/- to 20/- & up.	...
p Phosphor Bronze, plain castings ,,	1/3½	...
p ,, ,, drawn bars & rods ,,	1/8	...
p ,, ,, rolled strip & sheet ,,	1/9½	...
p ,, ,, wire ... ... ,,	1/8½	...
o Platinum ... ... per oz.	£3⅝	...
d Silicium Bronze Wire ... ... per lb.	1/4½	...
r Steel, Magnet, in bars ... ... ,,	7½d.	...
a Tin, Block (English) ... ... per ton.	£252 15s. to £253 5s.	20s. to 25s. dec.
a ,, Wire, Nos. 1 to 16 ... ... per lb.	2/11	...

*For 1 cwt. lots. Special quotations against definite specifications.

Quotations supplied by

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
m P. Ormiston & Sons.
o Johnson, Mathey & Co., Ltd.
p C. Clifford & Son, Ltd.
r W. F. Dennis & Co.

A Conference of Women.—Under the auspices of the Women's Engineering Society, in co-operation with the Electrical Association for Women and other women's associations, a Conference of Women in Science, Industry and Commerce, will be held under the presidency of H.R.H. the Duchess of York, at the British Empire Exhibition, Wembley, on July 15th to 17th inclusive, 1925, when Lady Astor will take the chair. Several papers will be read during the conference, including "Electricity applied to Mining," Miss H. M. Davis (Women's Engineering Society); "The Effect of Welfare Work on Health and Efficiency," Miss C. U. Kerr (Industrial Welfare Society); "Salesmanship," Miss G. Burlton, B.A.; "Producing and Distributing Electricity," Miss M. Partridge, B.Sc. (Electrical Association for Women); and "At Home with Electricity," Miss T. J. Dillon, B.Sc. (King's College for Women, Domestic Science Department).

Royal Air Force Display.—The sixth Royal Air Force Display (formerly called the Aerial Pageant), will be held at Hendon to-morrow. The programme contains many new and interesting features, while still retaining several of the events which have proved to be popular in the past. An event of electrical interest will be squadron drill carried out by wireless telephony, all the orders being given by the squadron leader from his machine in the air with the exception of one order which will probably be given by the King from the ground station. The use of wireless telephony for squadron operations is entirely new, and has not been adopted in any other country. It not only enables the squadron leader to pass his instructions with certainty, but also assists the pilots. Over one hundred aircraft, almost entirely drawn from home defence units, will take part in the display.

Charges for Electricity.

By THOMAS CARTER, M.Inst.C.E., M.I.E.E.

(*Concluded from page 967.*)

If the maximum output of the station during a year is D kW, the units generated, on the assumption that this output continued for a year of 8,760 hours, would be 8,760 D. They are, however, actually N, which is always less than 8,760 D. Let $N/8{,}760\,D$ be L, the general load factor. Then C/N, the part of the fixed charges apportionable to each unit sold, is equal to $(C/D)/8{,}760\,L$. Thus the total cost to the undertaking per unit sold, including provision for profit, is—

$$\frac{C/D}{8{,}760L} + \frac{K}{240} \text{ pounds; that is, } \frac{C/D}{36{\cdot}5L} + K \text{ pence.}$$

C/D is the part of the fixed charges apportionable to each kW of maximum demand on the station, that is, to each kW of capacity of the plant actually in use to supply the demand. For convenience in manipulation, transform K/240 into a form similar to $(C/D)/8{,}760\,L$; let K/240 be equal to $(C/D)/8{,}760\,Q$. (Q is thus the load factor at which the two parts of the cost become the same; it is equal to $(C/D)/36{\cdot}5\,K$.) Since everything has been included in making up the cost, the average selling price per unit sold to consumers will thus be, with $(C/D)/36{\cdot}5\,Q$ inserted in place of K—

$$\frac{C/D}{36{\cdot}5}\left(\frac{1}{L} + \frac{1}{Q}\right) \text{ pence.}$$

This, since $L = N/8{,}760D$, is the same as

$$\frac{C/D}{36{\cdot}5}\left(\frac{8{,}760D}{N} + \frac{1}{Q}\right) \text{ pence per unit sold.}$$

The total revenue is N times this, or

$$\frac{C/D}{36{\cdot}5}\left(8{,}760D + \frac{N}{Q}\right),$$

which, by a substitution for Q in terms of K, clearly becomes the same as the required amount of $240C + KN$ pence, or $C + KN/240$ pounds.

Now consider the corresponding expression relating to an individual consumer. The diversity factor F of the system is the ratio of the sum of all consumers' maximum demands to the actual maximum demand on the station plant. That is, the sum of all consumers' maxima is FD. Let the maximum of any one consumer be aFD, and let the units taken by that consumer be bN. (Obviously Σa and Σb are each unity.) The consumer's load factor l is $bN/8{,}760aFD$. If it be assumed for the moment that the price payable by a consumer is of the same form as—

$$\frac{C/D}{36{\cdot}5}\left(\frac{1}{L} + \frac{1}{Q}\right),$$

which is the average selling price necessary to give the required revenue, then, since Q is a station constant, not depending on the consumer in any way, the consumer would pay—

$$\frac{C/D}{36{\cdot}5}\left(\frac{1}{l} + \frac{1}{Q}\right) \text{ pence per unit, that is, } \frac{C/D}{36{\cdot}5}\left(\frac{8{,}760aFD}{bN} + \frac{1}{Q}\right).$$

His bill, since he takes bN units, would be

$$\frac{C/D}{36{\cdot}5}\left(8{,}760aFD + \frac{bN}{Q}\right),$$

based on his individual maximum demand and his individual load factor. But if all the consumers' bills are sent out on this basis, since Σa and Σb are each unity, they will, when added up, amount to—

$$\frac{C/D}{36{\cdot}5}\left(8{,}760FD + \frac{N}{Q}\right),$$

The diversity factor F is always unity or more, and therefore the sum of the bills made out thus is more than is required. To make the total correct, the first expression inside the bracket in the consumer's formula must be divided by F, so as to give the required total of—

$$\frac{C/D}{36{\cdot}5}\left(8{,}760D + \frac{N}{Q}\right),$$

and the proper procedure is therefore to charge each consumer not on the basis of $(1/l + 1/Q)$ but on the basis of $(1/Fl + 1/Q)$; that is, the price to each consumer is—

$$\frac{C/D}{36{\cdot}5}\left(\frac{1}{Fl} + \frac{1}{Q}\right).$$

(The question of the effect of diversity factor is examined in considerable detail in the papers recently read, particularly in its bearing on the relation between members of a group of consumers.)

It will have been noticed that in my suggested scheme the supply is counted in kWh, and not in kVAh at all. The difficulty of providing logically for the introduction of power factor into the cost formula is very great, and, as an inquirer, I must say that I have not begun to see how it can be done. If kVA instead of kW is used in the formulæ that have been developed, Σa and Σb are not unity arithmetically, although they may be so vectorially; and the difficulty of metering satisfactorily except in terms of kWh makes it doubtful whether it is possible to include power factor among the elements that go to make a properly devised tariff. After all, consumers cannot always help working at a bad power factor; their requirements may be such as, say, to make individual drives with small motors essential; and if the consumer is not working at a lower power factor than might have been expected from his circumstances, I should be inclined to say "All right." If it is desired to make some allowance in the charge on account of power factor, I suggest that everything should be measured in kWh and kW up to the point of ascertaining the price per unit to be paid by any given consumer, and that this price should then be increased or diminished according as the power factor is lower or higher than either (*a*) the general power factor of the system, or, as an alternative, (*b*) the power factor that might be expected in the circumstances of the consumer's installation; I think (*b*) is possibly the fairer of the two alternatives. To say this scarcely touches the problem, however, for the whole question of how to ascertain the power factor is left undiscussed, and except in very special cases I believe that power factor, like other things that have been mentioned, may be left to average itself out. It is probably bad policy to penalise a consumer for using the only kind of apparatus conveniently available.

Returning now to the proposed basis of charge per unit, we see that as l diminishes, the price increases, and would increase to infinity if no units at all were taken in any given period. I would propose, however, to stop the increase at some cost chosen more or less arbitrarily, and to charge at that price per unit for all totals that happened to be less than the number of units corresponding to the point at which that cost first occurred. This will be dealt with in greater detail later; but it is this price (which may be called the reference price) that will be used as the basis of the discounts in the way to be described. It is therefore an important element in the scheme. If accounts are rendered m times per annum (both monthly and quarterly accounts are used), the period covered by each account is $8{,}760/m$ hours. If the maximum demand of a consumer during the year is d kW, and if he consumes u units in the period of $8{,}760/m$ hours between two readings of his meter, his load factor l is $(u/d)/(8{,}760/m)$. Inserting this in the expression already found gives, as the price to be paid—

$$\frac{C/D}{36{\cdot}5}\left(\frac{8{,}760/m}{Fud} + \frac{1}{Q}\right) \text{ pence per unit.}$$

From this it is clear that, since the maximum value of u/d in any period is $8{,}760/m$, the minimum price per unit, when a consumer's load factor reaches unity, is—

$$\frac{c/D}{36{\cdot}5}\left(\frac{1}{F}+\frac{1}{Q}\right).$$

The reference price M may now be considered. Let it be the price chargeable when U units per period are taken, the maximum demand still being d kW; then—

$$M=\frac{c/D}{36{\cdot}5}\left(\frac{8{,}760/m}{FU/d}+\frac{1}{Q}\right),$$

and

$$\frac{U}{d}=\frac{(8{,}760/m)/F}{\frac{36{\cdot}5M}{c/D}-\frac{1}{Q}}=\frac{(240/m)\,(c/D)\,F}{M-\frac{c/D}{36{\cdot}5Q}}.$$

As has been said, M is chosen arbitrarily; it should, however, be large enough to make the load factor corresponding to U less than would usually be met with. Should any consumer's price work out in the standard formula to something higher than M, it would be charged at M only. The load factor corresponding to M is $(U/d)/8{,}760/m)$. If the price per unit is X at any other point, the discount z is $(M-X)/M$, since $X=M(1-z)$.

$$M=\frac{c/D}{36{\cdot}5}\left(\frac{8{,}760/m}{FU/d}+\frac{1}{Q}\right)$$

$$X=\frac{c/D}{36{\cdot}5}\left(\frac{8{,}760/m}{Fu/D}+\frac{1}{Q}\right)$$

$$(1-z)=\left\{\frac{8{,}760/m}{Fu/d}+\frac{1}{Q}\right\}\Big/\left\{\frac{8{,}760/m}{FU/d}+\frac{1}{Q}\right\}$$

$$z=\left\{1-\frac{U/d}{u/d}\right\}\Big/\left\{1+\frac{FU/d}{(8{,}760/m)Q}\right\}.$$

The scheme, then, is to charge all consumers alike at M pence per unit, less a discount denoted by the expression for z just given, U/d being a constant dependent on M in the way already shown. This single charge leads to precisely the same total as the charge under a two-part tariff does, but it looks different; and that, as I have suggested, is really important. The only variable in the expression for z for any one undertaking is u/d, and if any explanation is necessary, a consumer can suitably be told that the discounts have been carefully worked out on the basis of cost of supply, and will be greater the greater he makes u and the less he makes d. It has been assumed all through that z is the general diversity factor of the system, and is therefore constant; one of the recent papers suggests going further, and grouping consumers with similar diversity factors into a kind of composite consumer. Presumably each group of consumers would then have the total cost of its supply split up amongst the individuals in the group; and my scheme could equally well be applied to that apportionment, on the basis of individual load factors. Reference should be made to both the recent papers for fuller discussion of points identical with and akin to several that have been mentioned here.

It is easy to see that the expression for a consumer's total bill for any period is merely another form of the formula for a two-part tariff that charges a fixed sum per kW of maximum demand and an additional amount for each unit taken. The price per unit being

$$\frac{c/D}{36{\cdot}5}\left(\frac{8{,}760/m}{Fu/d}+\frac{1}{Q}\right),$$

the amount payable for u units is

$$\frac{(240/m)\,(c/D)}{F}d+\frac{c/D}{36{\cdot}5Q}u,$$

which is of the form described. The annual payment by this consumer is $\frac{240c/D}{F}d+\frac{c/D}{36{\cdot}5Q}\Sigma u$, and the sum of all accounts like this is $240(c/D)\frac{\Sigma d}{F}+\frac{c/D}{36{\cdot}5Q}N$, which is $240(c/D)D+KN$, that is, $240c+KN$ pence, as required. Again, since $(240/m)\,(c/D)=(FU/d)\{M-(c/D)\,36{\cdot}5Q\}$, the amount payable for u units is $\left\{M-\frac{c/D}{36{\cdot}5Q}\right\}U+\frac{c/D}{36{\cdot}5Q}u$

or

$$MU+\frac{c/D}{36{\cdot}5Q}(u-U),$$

which is a form leading, as far as I can see, to the curves of one of the two recent papers. From this, a modification of the expression for discount is obtainable. For if there had been no discount, the bill would have been Mu; and thus the discount is—

$$z=\frac{Mu-MU-\{(c/D)/36{\cdot}5Q\}\,(u-U)}{Mu}$$

$$=\frac{M-(c/D)/36{\cdot}5Q}{M}\cdot\frac{u-U}{u}=\frac{M-(c/D)/36{\cdot}5Q}{M}\left\{1-\frac{U/d}{u/d}\right\},$$

d being inserted below U and u to preserve the previous form suggesting load factor. The two expressions for z are of course identical, and are merely differently stated.

It will be seen from what has been written that since the total of the consumer's bill is calculable from—

$$\frac{(240/m)\,(c/D)}{F}d+\frac{c/D}{36{\cdot}5Q}u,$$

both the charge per kW of maximum demand and the additional charge per unit are constants dependent on the characteristics of the whole undertaking, and therefore the first item cannot possibly have any direct or proper connection with the rateable value of the consumer's premises, their floor area, the number of rooms wired, or any of the other things that are introduced in various places. The maximum demand is no doubt related, though remotely and in a quite uncertain way, to some of these things; but it should rather be ascertained, as can be done with reasonable accuracy, from an examination of the apparatus actually installed. The necessary investigation of how it is used can be made with less trouble than must be taken to ascertain, say, the floor area. It is, indeed, an open question whether some of these tariffs do not lead to infringements of Clauses 19 and 20 of the Electric Lighting Act of 1882 in respect of the provisions stipulating the same terms for similar consumers, and prohibiting undue preference. Two persons may be taking the same number of units per annum, with the same load factor, and yet, because their houses are of a different size or shape or value, they pay different amounts. That is surely undue preference, is it not? Could not the consumer who is charged more claim successfully to be put on the same basis of price per unit as the other consumer? On the other hand, two consumers may be taking the same number of units per annum, with different load factors, and yet because they live in houses with the same number of rooms, they will pay the same amount for the units they take, which means that the more useful consumer is paying more than is just, and the less useful less. These anomalies would be avoided by a scheme such as I have outlined, which seems to me to be at least as easy to apply as any other I know of. Even it, as I have been careful to say, is itself an approximation, and it may need many additions if it is to be of use at all; but it does at least attempt to base itself on pertinent facts, and everything in it is definitely related to some characteristic of the supply.

Take now, in conclusion, a numerical example, with figures selected at random, and not necessarily correct for any existing station, but useful as a means of translating the symbols of the formulæ into something more familiar-looking. Let there be plant of 20,000 kW in the station, and let the capital expenditure have been £900,000. Let the capital charges, including provision for profit, be 10 per cent. per annum, and let the number of units sold per annum be 36,000,000, with a maximum load on the station of 14,400 kW. Assume that the generating costs at 36,000,000 units are 0.60 pence per unit, of which 0.10 pence per unit, or £15,000, is fixed, and consequently forms part of c, and the remainder, 0.50 pence per unit, is the amount chargeable for every unit alike, no matter how large or how small the output is. That is to say, $K=0.50$. The load factor is $36{,}000{,}000/(14{,}400\times 8{,}760)=0.285$. The capital charges are £90,000; hence $c=$£105,000, and $KN=$£75,000, which indicates that the total revenue required is £180,000. c/D is 105,000/14,400, or 7.3.; Q is $7.3/(36.5\times 0.50)$, or 0.40; $(c/D)/36.5=0.20$. Hence the average cost per unit sold is 0.20 $\{(1/0.285)+$

$(1/0.10)\}$, or 0.20 (3.5+2.5), or 1.2 pence per unit; and the minimum price to a consumer with unity load factor, when F=1, is 0.70 of a penny per unit.

Now consider the consumers' side of the account. Take F as 1.5, which means that the sum of consumers' maxima is 21,600 kW. Let the whole be assumed to be taken by two consumers, A and B, of whom the first has $d=12,600$ and $u=24,000,000$, and the second $d=9,000$ and $u=12,000,000$. We will suppose that M has been fixed at 6 pence per unit as a reference price. Then, with F=1.5, and $m=1$, since annual values are being used throughout the example, $v/d=212.4$. This means that any consumer taking $212.4d$ units per annum, or less, will be charged at 6 pence per unit, while all those taking more than $212.4d$ will have the benefit of a discount. (Note that M may be fixed at any figure, and a corresponding value of v/d will then be found that will lead to exactly the same final results as are given by any other related values of M and v/d.) The discount for A will be found to be 0.815 (81.5 per cent.), so that A pays 0.185 of 6 pence, or 1.11 pence per unit, giving a total of $24,000,000 \times 1.11/240 = £111,000$; and the discount for B is 0.77 (77 per cent.), so that his price is 1.38 pence per unit, giving a total of $12,000,000 \times 1.38/240 = £69,000$. The sum of the two is £180,000, as required. The same results would, of course, be arrived at by using the other forms of the expression, but the method of using a reference price and discounts is taken here to illustrate my suggested scheme for a one-part bill. Tables of discounts dependent on u/d can be calculated from—

$$z = \left\{1 - \frac{v/d}{u/d}\right\} \Big/ \left\{1 + \frac{Fv/d}{(8,760/m)Q}\right\}$$

for various values of F, and finally the whole thing becomes a simple clerical operation, once the initial details have been settled. It is clear from the expression for z that $z=0$ at $u/d=v/d$, as might be expected. For u/d less than v/d, z calculates to a negative quantity, but the convention is that it remains zero for all values of u/d less than v/d.

So long as the value of d is not altered, the total payment per annum by any consumer is entirely independent of the number of times the unit meter is read and bills are sent in; that is, it does not depend at all on the value of m. Suppose $F=2$, $d=1,000$, and $u=1,600,000$ per annum, taken in the twelve successive months in the following quantities: 100,000, 180,000, 260,000, 120,000, 80,000, 20,000, 60,000, 150,000, 50,000, 200,000, 160,000, and 220,000. Then, with the other particulars as before, $v/d=212.4$ again; the discount, if an account is rendered once a year, is 0.795 (79.5 per cent.); the price per unit is 1.23 pence; and the bill is £8,200. If done quarterly, with amounts of 540,000, 220,000, 260,000, and 580,000, the discounts vary, and the quarterly bills are £2,340, £1,680, £1,760, and £2,420, totalling to £8,200 again. If monthly bills are used, the discounts are different in each month, but the total of £8,200 is arrived at again, the monthly bills being £611, £780, £951, £655, £573, £448, £530, £718, £510, £823, £739, and £862. (The amounts are given with slide-rule accuracy only.) This correct totalling was to be expected from what has been shown in regard to the several formulæ; it is interesting to confirm it in actual figures. The only possible cause of departure from a correct total would be that in some period the price went into the M region; but the effect would be small even if it did so, because of the small number of units involved.

As a note on adjustments in prices on account of variations in cost of coal and changes in wages, it may be said that because parts of these belong both to C and to K, but not necessary so as to alter the two parts of the price per unit in the same ratio, they cannot usually be dealt with accurately by merely adding to or subtracting from the whole account something on a percentage basis. New values, C′ and Q′, of C and Q should be calculated, and accounts should be made up on the modified basis throughout, new values for the discounts being calculated from the new values of v/d and Q.

I am not sure that all this that I have written answers the question in the short leader referred to at the outset; it seems to deal with it by interpreting the two-part tariff so as to make it look as if it had only one part. But I venture to think that there is perhaps some value in a suggestion for a tariff founded really and correctly, as far as may be, on actual costs, and simple enough to allow supply undertakings to present accounts consisting of only one item to all consumers, large or small.

Electrical Trade Organisation in Australia.

By E. PERUGINI, General Manager, The Electrical Federation (Victoria).

It may interest the readers of the ELECTRICAL REVIEW to have some notes on the condition of the electrical industry in Victoria, Australia, and on the activities of the Electrical Federation (Victoria). The Federation was brought into being some three years ago, by the electrical contractors' and traders' associations. It follows a very unusual principle in industrial organisation, in that it combines under one control both the buying and selling interests of the industry. The Federation is sectionalised as follows:—The Wholesale Section, comprised of the very great majority of the wholesale supply houses in the State of Victoria; the Retail Section, comprised of the electrical contractors and retail shopkeepers; and a recently-formed Radio Section. It thus covers all phases of the commercial side of the electrical industry. The Federation has as its ultimate ideal the organising of the supply and technical side of the industry as well as the commercial side, but that is an ideal that is probably some years ahead. During the three years of its existence the trading conditions have been very much stabilised, thanks to the growth of confidence between the members of the sections.

The Federation has a council composed of executive officers, and an equal number of members from each section. All affairs of policy, and matters affecting the Federation as a whole, are dealt with by the council. The sections are autonomous in matters affecting their domestic interests; each section has its committee composed of the chairman of the section and a certain number of members. Each section has also found it expedient to divide into sub-sections; thus on the Wholesale Section side, we have sub-sections dealing with the following matters:—Lamps; wiring accessories; domestic appliances; motors and generators; wires and cables; and an indentors' sub-section. The Retail Section has a retail electrical shopkeepers' sub-section and a city contractors' sub-section, and it is suggested that district sub-sections should be formed to deal with the local problems of the various suburban and country areas. The Radio Section has divided into wholesale and retail sub-sections.

The aims and objects for which the Federation was inaugurated are as follows:—(*a*) To further the interests of members by modern scientific methods of co-operation and organisation; (*b*) To assist and further the interests of producers, suppliers and consumers of electrical energy, and of manufacturers, distributors, contractors, purchasers, and users of electrical commodities and appliances, and to promote and facilitate co-operative planning; (*c*) To encourage the standardisation of electrical material; (*d*) To originate and promote improvements in the law and to support or oppose alterations therein, and to effect improvements in administration in matters connected with the electrical industry; (*e*) To inaugurate and carry out publicity for the popularisation of electricity and electrical appliances, and methods by the collection and distribution among members of data relating to the electrical industry; (*f*) To provide for and be a central medium of useful and confidential information available for members and generally for the furtherance and promotion of their interests; and (*g*) To further these objects by direct or indirect action or in co-operation with any other organised body or bodies having objects similar to those of the Federation.

To secure fair trading conditions, the Federation has brought about preferential trading discounts between sections; it has laid down a scale of trading discounts, and has inaugurated a trade list, making it possible for people or firms to be put on

the trade list only under certain specified conditions, and members sell to no one not on that trade list, at other than retail prices. This arrangement is working quite satisfactorily, and all new people wishing to enter the electrical contracting or distribution side of the industry now approach the Federation to be placed on the trade list. On the wholesale side the activities consist of the control and maintenance of discount; educational work to the public; negotiating with the supply authorities on such questions as authorisation and standardisation of material; Customs questions; and the political and legislative side of the industry, in so far as it affects the distribution, manufacture and importation of electrical goods. On the retail side the activities of the Federation are very much more of an educational character, the main idea being to educate electrical contractors in better business and selling methods. It has evolved a standard book-keeping system for the use of contractors; regular lectures are given on wiring rules and regulations; on costing and overhead charges; on salesmanship; on running a retail electrical shop and so forth. The Retail Section has a debt-collecting system in operation through the Federation. Demonstrations are given of electrical appliances so as to educate contractors and their staffs in the methods of selling domestic appliances; technical matters are also dealt with and the Federation takes up any legitimate dispute between its contracting members and the supply authorities. The Radio Section's activities at present are very largely confined to purely domestic matters as the section is not yet thoroughly organised, having only been in existence for the last three months.

The Federation, as a body, acts in all matters with outside organisations, such as the State Electricity Commission and the supply authorities, through the Council, and it has discussed with the Commission such legislative matters as the registration of contractors, which is a different matter from the existing licensing of wiremen. At the present moment electrical installations are inspected by two or three bodies, and the wiring rules and regulations are at times interpreted differently by different authorities and inspectors. The Federation is therefore asking for a uniform system of inspection and a standard interpretation of the regulations. With regard to the standardisation of materials for use throughout the State, the Federation has been negotiating with the State Electricity Commission for the latter to obtain legislative power to form a board, comprised of the interests concerned, which should have statutory powers to say whether or not materials and appliances may be used. The relations between the Electrical Federation and outside bodies is most cordial.

Arrangements are now being made by the Electrical Federation for continual publicity in the Press during the coming twelve months by inaugurating a special advertising campaign along the lines of those carried out by the British Electrical Development Association and the Society for Electrical Development, America. Data has been collected and will be distributed to the Press throughout the State; a definite advertising campaign will probably be organised, in which it is hoped the supply authorities will also co-operate. When this part of the Federation's activities is on a firmer basis, the next move will, in all probability, be the formation of a statistical bureau. During the coming twelve months in addition to this, the Federation will be undertaking the formation of a school of salesmanship, and the organising of a large electrical exhibition.

Exports and Imports of Electrical Goods and Machinery in May, 1925.

In comparing the statistics of our foreign electrical trade during May with the preceding month's figures it has to be remembered that April was a shorter month owing to Easter. It was, however, a good month so far as exports were concerned, and therefore the increase of £102,890 shown by the May figures may be taken as a continuation of the progress which has been made during the current year. The advance made by the electrical branch during May is all the more satisfactory when it is observed that foreign trade generally showed a decline. The principal factor in the export list is again submarine telegraph and telephone cable, the increase of £83,245 in this item being by far the largest variation. The largest proportional increases, however, occurred in the items "Switchboards (not telegraph or telephone)" and "Telegraph and telephone wires and cable (not submarine)." Other important rises were £44 000 in the value of exported machinery and £21,000 in the case of batteries and accumulators. There was a considerable decline in the exports of telegraph and telephone instruments and apparatus, although proportionally the falls in the values of exported carbons and are lamps and parts were greater. As compared with May, 1924, the export total shows a substantial increase. This was due mainly to submarine telegraph and telephone cable, the increases and decreases in the other items being fairly evenly balanced.

The outstanding feature of the import section was a reduction of £55,633 in the value of telegraph and telephone instruments and apparatus. Only three items showed increases, one of them being "Glow lamps," which experienced an unusual rise (£12,649), which is further emphasised by the comparison with May, 1924, showing an increase of £34,360.

Apart from an increase of £11,334 in the item "Electrical goods and apparatus (unenumerated)," and a fall of £5,821 in telegraph and telephone instruments and apparatus, there is nothing of note in the re-export section.

The totals for the first five months of the year show that the increase of exports as compared with the equivalent period of 1924 is nearly equal to the last month's exports. On the other hand, the increases in the imports and re-exports are in excess of the May totals, indicating that the exports have advanced at a lower rate than the other two branches.

	Exports.			Imports.			Re-Exports.		
	Electrical exports for May, 1925	Inc. or dec. as compared with Apr., 1925.	Inc. or dec. as compared with May, 1924.	Electrical imports for May, 1925.	Inc. or dec. as compared with Apr., 1925.	Inc. or dec. as compared with May, 1924.	Electrical re-exports for May, 1925.	Inc. or dec. as compared with Apr., 1925.	Inc. or dec. as compared with May, 1924.
Electrical goods and apparatus (unenumerated)	£134,047	− £12,010	− £31,437	£88,347	− £12,754	+ £6,029	£16,419	+ £11,334	+ £8,778
Insulated wires and cables ...	195,095	+ 3,228	− 31,537	35,020	− 10,716	− 5,335	3,366	+ 1,641	+ 2,508
Glow lamps	32,546	− 8,207	+ 6,026	42,216	+ 12,649	+ 34,360	264	− 267	− 322
Arc lamps and parts	559	− 6,421	− 147	758	− 183	− 1,085	28	− 1,700	− 15
Batteries and accumulators ...	96,200	+ 20,987	+ 27,282	20,986	− 7,396	+ 5,663	1,569	− 264	+ 1,209
Meters and instruments ...	28,183	− 6,009	− 19,271	17,430	− 6,521	− 2,558	1,187	+ 729	+ 305
Carbons	922	− 1,485	− 1,092	8,878	+ 257	− 11,268	55	− 54	+ 22
Electrical Machinery—									
Electrical machinery (unenumerated)	326,728	+ 13,378	+ 84,819	99,295	+ 1,197	− 18,473	5,609	+ 190	− 4,587
Railway and tramway motors	37,395	− 962	+ 14,131	—	—	—	—	—	—
Other motors and generators ...	182,615	+ 30,661	− 9,538	—	—	—	—	—	—
Switchboards (not telegraph or telephone)	12,428	+ 5,266	+ 6,624	70	− 81	+ 57	95	+ 87	+ 70
Telegraph and Telephone Cable and Material—									
Telegraph and telephone wires and cable (not submarine)	69,636	+ 25,902	− 39,775	14,353	− 282	+ 2,972	233	+ 172	+ 163
Submarine telegraph and telephone cable	373,597	+ 83,245	+ 346,765	—	—	—	—	—	—
Telegraph and telephone instruments and apparatus ...	218,420	− 44,683	+ 24,948	47,139	− 55,633	− 16,839	5,432	− 5,821	+ 695
Totals	£1,708,371	+ £102,890	+ £377,798	£374 492	− £79.463	− £6,478	£31,257	+ £6,048	+ £8,886

Increases for the five months ended May, 1925	Exports.	Imports.	Re-exports.
	+ £1,658,142	+ £598,664	+ £37,486

Germany's Foreign Electrical Trade in 1924.*

A Comparison with the Pre-war Figures.

It is now possible, with the aid of the "Monthly Information on the Foreign Trade of Germany" for December, 1924, to form an idea of the development of the German foreign electrical trade for the whole of last year, and in this connection a comparison with 1923 and 1913 is important.

The imports, as shown in Table I, amounted to a value of 9.5 millions of Reich marks (gold) in round figures in 1924 (the totals for 1923 are lacking) as compared with about 14.5 millions in the year 1913; despite the restrictions the imports were consequently not so small as is frequently assumed.

The total value of the exports in 1924 amounted to 290.6 millions of Reich marks; it was consequently almost exactly equal to that in the previous year, but not inconsiderably less than in the year 1913. Table II shows these exports classified according to the various manufactures. The most surprising feature is the large decline in the exports of machines and transformers, the total value of which only amounted to 45.8 millions as against 55 millions in the year 1923 and 64.4 millions before the war. In this group a reduction in the exports of medium and large types is observable, while the sale of the small machines increased. Although the figures for cables and conductors are somewhat higher than in the preceding year, they still remain far behind those for 1913. A very large diminution is also shown by glow lamps, the export value of which was only about one half that of 1913; the exports of apparatus and installation materials also declined last year. With the exception of accumulators, and cooking and heating apparatus, the trade in plant for heavy current experienced a material decline in comparison with the pre-war period. On the other hand the export business in "weak current" apparatus increased. The large increase in telephone and telephone apparatus was brought about chiefly through the development of radio telegraphy and telephony and automatic telephony. The export figures for radio material, not shown separately in the table, were 1,646 millions of marks in 1913, 8,651 millions in 1923 and 19,207 millions in 1924. The sales of electro-medical apparatus also largely increased and those of measuring instruments and meters to a somewhat smaller extent.

The destinations of the exports are shown in Table III. The main body of the exported goods went to European countries. The share in the total figures of the countries not specifically mentioned was much greater in the years 1923 and 1924 than in 1913, namely, 23.3 per cent. and 20.2 per cent. respectively, as compared with 7.7 per cent. in 1913. The exports to Great Britain were augmented, but they did not reach the pre-war value. As compared with 1923 there were increases in the cases of Soviet Russia, East Poland, Sweden, Switzerland and Japan. In the remaining countries, however, the comparison of the years 1923 and 1924 shows retrogression in respect of Holland, Norway, Czecho-Slovakia, Rumania, Spain, and almost all oversea countries. Only in respect of Finland, Holland, Sweden, Brazil, and China, has the pre-war value been again reached.

Although the decrease in the electro-technical exports of Germany from 324.1 millions of marks in the year 1913 to 290.6 millions in 1924, or by about 10 per cent., is not so considerable as in the case of the aggregate German exports (which fell from 10,097 millions to 6,567 millions, or by 35 per cent.), yet the export figures attained are unsatisfactory having regard to the fact that the world's requirements of electrical material have immensely increased since 1913. It also has to be remembered that the price level of most products was not inconsiderably higher than in 1913, so that the actual quantities remain still more behind the last peace year than the export value. In fact the exports of electro-technical products in 1913 amounted to 155,400 tons, but were only 125,800 tons in 1924 or a reduction of 19 per cent. Moreover, in order to make a correct comparison with the pre-war period, it is necessary to make a considerable deduction from the post-war export figures for the lost districts of Alsace-Lorraine, Dantsic and Western Poland, as well as for the Saar district, which also appears as a foreign country for Customs purposes. The total value of the exports to these countries amounted to 6.39 millions of marks in 1924. The reasons for the decline of electrical exports are of various kinds. During the war and in the early part of the post-war period the principal competitors of Germany in the world market—the United States and Great Britain—greatly developed electrical production and exports and ousted Germany from many places. Table IV shows how the share of the five most important export countries has increased since 1913 to the disadvantage of Germany. In the meantime other countries, which were formerly almost entirely dependent on the importation of electrical products, have commenced their manufacture and have thus made themselves more or less independent of foreign goods. Other countries have greatly lost purchasing capacity, as in the case of Russia. The last and perhaps most important difficulty in foreign trade is the high customs walls with which many countries have surrounded themselves. The burden placed on German products by import duties in Belgium, France, Italy, Poland, Spain, Czecho-Slovakia and in a number of oversea countries is positively prohibitive. In many countries German products are subject to higher duties than other countries' products. As a consequence industry and government must unite in an endeavour to bring about an improvement in this direction by negotiating treaties of commerce, and re-gain for German trade its due position in the world market.

* *Elektrotechnische Zeitschrift.*

TABLE I.—GERMAN IMPORTS OF ELECTRICAL GOODS.

Class of goods.	1913. Thousands of gold marks.	1923.	1924.
Machines, transformers, &c.	3,564	*	2,644
Glow lamps	1,026	986	1,778
Telegraph, telephone and radio apparatus	730	1,191	1,265
Lighting and power transmission apparatus	2,745	*	736
Measuring and recording instruments	1,658	894	1,844
Other manufactures	4,736	*	1,292
Totals	14,449	*	9,539

* Figures not available.

TABLE II.—GERMAN EXPORTS OF ELECTRICAL GOODS.

Class of goods.	1913. 1,000 marks.	1913. Percentage of total.	1923. 1,000 marks.	1923. Percentage of total.	1924. 1,000 marks.	1924. Percentage of total.
Machines, transformers, &c.—						
Weighing up to 25 kg.	2,867	0.90	5,587	1.93	5,211	1.79
From 25 to 100 kg ...	7,223	2.23	6,778	2.34	5,343	1.84
From 100 to 500 kg. ...	14,426	4.45	12,393	4.27	9,235	3.17
Over 500 kg.	31,989	9.90	23,198	8.00	20,598	7.08
Complete armatures and commutators	7,875	2.43	7,090	2 45	5,425	1.87
Accumulators and plates	5,737	1.78	5,126	1.77	6,084	2.09
Cables	39,266	12.10	16,719	5.77	21,526	7.40
Insulated wires ...	21,750	6.73	16,966	5.85	17,670	6.10
Glow lamps	48,114	14.90	32,441	11.20	23,129	7.87
Lighting and power transmission equipment and other apparatus not specifically mentioned	74,047	22.80	70,012	24.2	65,146	22.50
Heating and cooking apparatus	1,675	0.52	5,773	1.99	5,380	1.86
Telegraph, telephone, and radio apparatus ...	14,380	4.43	26,681	9.20	37,908	13.10
Electromedical apparatus	4,564	1.41	11,030	3.80	11,582	3.98
Measuring and recording instruments	24,230	7.50	29,538	10.20	30,566	10.50
Carbons	12,116	3.75	7,343	2.53	8,451	2.90
Miscellaneous	13,240	3.97	13,247	4.50	17,259	5.95
Totals ...	324,121	100.00	289,922	100.00	290,612	100.00

TABLE III.—THE DISTRIBUTION OF GERMAN ELECTRICAL EXPORTS.

Country of destination.	1913. 1,000 marks.	1913. Percentage of total.	1923. 1,000 marks.	1923. Percentage of total.	1924. 1,000 marks.	1924. Percentage of total.
Belgium	21,557	6.65	5,549	1.91	4,261	1.47
Denmark	8,529	2.63	8,714	3.01	6,041	2.08
Finland	3,955	1.22	8,273	2.85	6,772	2.33
France	17,908	5.53	1,333	0.46	884	0.30
Great Britain ...	33,789	10.43	10,000	3.45	28,035	9.65
Italy	19,107	5.91	16,869	5.82	15,951	5.49
Holland	17,064	5.26	31,338	10.81	23,625	8.13
Norway	11,505	3.55	13,246	4.57	10,224	3.52
Austria	22,968	7.09	10,173	3.51	9,268	3.19
Czecho Slovakia			5,869	2.02	3,432	1.18
Hungary			1,520	0.52	264	0.09
West Poland ...			4,138	1.43	3,025	1.04
Rumania ...	4,305	1.33	3,566	1.23	1,446	0.50
Soviet Russia ...	35,469	10.94	4,399	1.52	6,847	2.35
East Poland ...			3,262	1.12	4,004	1.38
Esthonia			1,931	0.67	—	—
Latvia			2,398	0.83	376	0.13
Lithuania ...			1,044	0.36	—	—
Sweden	11,210	3.46	15,155	5.23	16,340	5.62
Switzerland ...	10,485	3.23	7,841	2.70	9,012	3.10
Spain	13,877	4.28	8,588	2.96	7,067	2.43
Totals European countries ...	231,798	71.51	165,205	56.98	156,874	53.98
Argentina ...	30,701	6.39	17,324	5.98	14,767	5.06
Brazil	7,944	2.45	9,665	3.13	8,232	2.83
Chile	6,144	1.90	5,487	1.89	4,311	1.48
Mexico	2,713	0.84	2,211	0.76	1,121	0.39
United States ...	9,962	3.07	7,177	2.48	5,392	1.83
British India ...	1,381	0.43	1,006	0.35	—	—
China	3,420	1.05	6,333	2.18	5,654	1.95
Japan	10,931	3.37	5,263	1.81	8,361	2.88
Netherlands East Indies	4.180	1.29	3,342	1.15	1,190	0.41
Totals non-European countries ...	67,376	20.79	57,208	19.73	48,908	16.83
Other countries ...	24,947	7.70	67,509	23.29	84,830	29.19
Grand totals ...	324,121	100.00	289,922	100.00	290,612	100.00

TABLE IV.—A COMPARISON OF THE ELECTRICAL EXPORTS OF THE FIVE PRINCIPAL COUNTRIES.

Country.	1913. Millions of marks.	1913. Percentage.	1923. Millions of marks.	1923. Percentage.	1924. Millions of marks.	1924. Percentage.
Germany	324.1	49.3	289.9	30.2	290.6	27.4
Great Britain ...	156.4	23.8	272.2	28.4	268.5	25.3
United States ...	108.0	16.5	297.3	31.0	344.3	32.5
France	43.9	6.7	58.5	6.1	102.0	9.6
Switzerland ...	24.8	3.7	41.9	4.3	54.9	5.2
Totals ...	657.2	100.0	959.8	100.0	1,060.3	100.0

The Ealing Signal Cabin.

New Electrically-Operated Apparatus.

OWING to the gradual growth of the railway traffic dealt with at Ealing Common, it has been necessary to dispense with one of the last of the old mechanical signal frames which were in use before the line was electrified. In order to provide additional operating facilities, a power frame has been installed in its place and, eventually, Hanger Lane junction will be controlled from the new frame, thus enabling the signal cabin at that place to be dispensed with. The whole of the work, including the permanent way alterations necessary to give a greatly improved lead into Ealing Common depôt, was carried out without interference with ordinary passenger traffic. In addition, all points had to be changed over from mechanical to electrical operation, the time allowed for the whole operation being four days. The total number of men employed in connection with the signalling work (both inside and outside) was 47, these being divided into shifts so that actually only half that number was working at the same time.

Fig. 1.—Old Signal Frame.

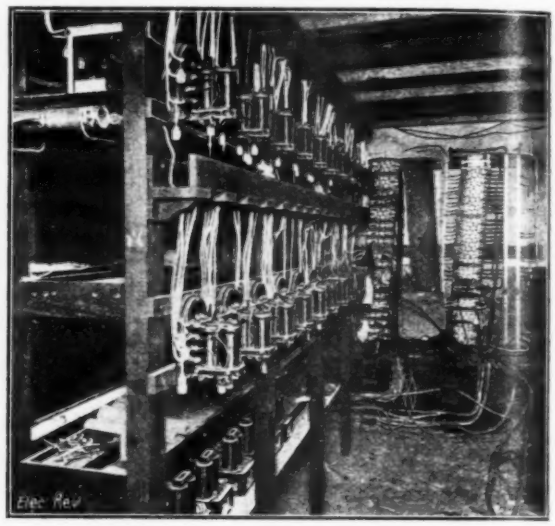


Fig. 2.—Basement Relay Rack.

Immediately after the passing of the last train, a start was made with pulling the old frame, fig. 1, to pieces, and by 3 a.m. the whole of it had been removed; the floor was removed by 4.30 a.m., and by 7 a.m. or 5 hours 50 minutes after the last train, the new floor was in position and ready for the installation of the new power frame, fig. 3 which was erected and the bulk of the wiring, fig. 2, completed by 4.30 p.m. The wooden casing was then fixed but no locking had been installed, and in the meantime the new illuminated diagram had also been fixed, fig. 3; it is provided with blank spaces on the left-hand side for the inclusion of the tracks of Hanger Lane junction when the control is transferred to the Ealing Common cabin. The next day, by 10.30 a.m., the whole of the apparatus was ready to be brought into commission. The new relay rack had previously been prepared in the basement, adjacent to its final position, and as much of the preliminary wiring done as possible; after the new floor had been laid, the rack was shifted bodily into its final position and the remainder of the wiring coupled up. The permanent-way alterations involved the alteration of six pairs of points. The points on the main road were taken out during the first night of the operations and the roads made straight through, the interval between the last train at night and first in the morning being little more than four hours. Afterwards the new layout into the depôt was gradually installed, the new points being power operated.

The signals at Ealing Common were made to work automatically during the change-over, so that throughout the whole period all trains were properly protected. The whole of the new permanent way layout, new power frame, &c., were brought into commission at 5.20 a.m. on March 10th, 1925.

Fig. 3.—New Signal Cabin.

Parliamentary.

[By Our Special Parliamentary Reporter.]

The Rutenberg Concession.—On June 15th, Colonel PERKINS asked the Colonial Secretary whether he could state the present position of the Rutenberg concession; whether any deadlock had arisen in the execution of this concession and, if so, what it was; and whether he was aware that local opinion was in favour of the harnessing of the water power of the Oudja.

Mr. ORMESBY-GORE said that the Palestine Electric Corporation's concession had now been put in a final form. No deadlock had arisen, but one or two minor points which it was not possible to foresee when the concession was originally drafted were still under discussion. The last part of the question referred to the Jaffa Electric Company's concession. Power was at present being supplied from a fuel station. Whether it would ultimately be supplied from a special hydro-electric station on the Oudja, as was originally contemplated, or from the Jordan power house, had not been decided.

L.N.E.R. Electrification.—On June 16th, Mr. R. C. MORRISON, a Labour member, moved the rejection of the London and North-Eastern Railway (General Powers) Bill. He complained that, among other things, the company had done nothing in the way of electrification.

Sir E. HUME-WILLIAMS said that the company had promised that if it came to the decision not to electrify its suburban lines it would give up its right to veto the construction of a tube. It had abandoned the veto, but no tube had been con-

structed. It had been found that so enormous were the difficulties in the way of electrification that the cost would be between five and ten millions sterling. Since the last Bill was before the House the company had spent £1,192,000 on capital engineering works, and, mindful of the fact that electrification, in its own interest as well as in the interest of the public, ought to come about as soon as possible, it had appointed a special electrical engineer who was reporting from time to time on the problem.

The Bill was read a second time by 274 votes to 127.

Electrical Transmission. — On June 16th, Sir WILFRED SUGDEN asked the Minister of Transport if he would give details of the results of his investigations upon the most suitable systems of switchgear for electrical transmission; and whether he would offer full facilities for the test of oil switchgear, in view of the essential of cheap and economical power transmission for national electric power requirements in industry before decision was arrived at for recommendation by the Government.

Col. ASHLEY said the investigations referred to were being carried out by the British Electrical and Allied Industries Research Association, which had for the past five years been engaged on research in connection with switchgear, including switchgear of the kind referred to. He understood that the Association was prepared to test switchgear of any kind which might be sent to it.

Inland Radio-Telegraphy. — On June 16th, Sir WM. MITCHELL-THOMSON, Postmaster-General, informed Captain GARRO-JONES that radio telegraphy was widely used for the transmission of telegrams to other countries and to ships at sea. Under present conditions, however, it would not be practicable or economical to use radio-telegraphy to any large extent for the inland telegraph service, although it was occasionally used for services to outlying islands when the normal lines were interrupted.

A Yorkshire Order. — On June 17th, Mr. THOMAS WILLIAMS asked the Minister of Transport if he would postpone the coming into operation of the Order granted to the Yorkshire Electric Power Company to lay cables in the district of Tickhill pending the settlement of a dispute between the power company and the local authority; and whether, as the Order did not specify distinctly the places where the cables were to be installed underground or overhead, he would have this question decided after consideration of the views of the local authority.

Colonel ASHLEY said the Order referred to appeared to be the South Yorkshire Electricity Special Order, 1924, granted by the Electricity Commissioners to the Electrical Distribution of Yorkshire, Ltd., which came into force on August 5th, 1924, and he had no power to postpone the coming into operation of the Order. The Electricity Commissioners were not aware of any dispute between the company and the local authority, nor had the company made an application for his consent to the placing of electrical lines above ground in Tickhill.

Subterranean Radio.—On June 17th, Viscount WOLMER informed Viscount SANDON that experiments in wireless transmission using buried cables instead of an aerial had been conducted by the Post Office from time to time, but the results did not suggest that such a system of transmission would be suitable for commercial purposes.

Private Bill.—The Uckfield Gas & Electricity Bill was read a second time in the House of Commons on June 16th.

The Gretna Factory.—On June 17th, Mr. HARDIE asked whether all the Government plant at Gretna had been sold; and whether any special arrangement had been made to keep the electrical generating plant for the service of the district.

Mr. GUINNESS (Financial Secretary to the Treasury), said that the bulk of the Government plant at Gretna had been sold, and arrangements were being made to sell the comparatively small quantity of plant now remaining. Protracted negotiations had taken place for the sale of the generating plant as a going concern. Unless those negotiations were brought to a successful conclusion at an early date it would be necessary for the Government to cease operating the plant, which involved, under existing conditions, a considerable loss, and to sell it for removal.

The Mersey Tunnel Scheme.—On June 15th, a House of Lords Committee commenced the hearing of the evidence for and against the Mersey tunnel scheme which is being promoted by the Corporations of Liverpool and Birkenhead. The scheme is opposed by the Mersey Railway Co. and the Wallasey Corporation.

Giving evidence for the promoters on June 22nd, Mr. BASIL MOTT, president of the Institution of Civil Engineers, said that the proposal to run tramways through the tunnel had been abandoned upon the representation of the Birkenhead Corporation that this would subject the Corporation's ferries to undue competition. It was proposed to utilise the space under the roadway for water, gas and electricity mains and for telephone and telegraph cables.

Mr. J. A. BRODIE, chief engineer of Liverpool, said that the Liverpool Corporation proposed to supply electricity in bulk to Birkenhead. The Mersey Railway Company was approached with a view to the cable being laid in its tunnel, but the company required a rental of £2,000 a year.

The hearing was adjourned after further evidence on behalf of the promoters.

Radio Apparatus and Import Duties.—Mr. W. GUINNESS, Financial Secretary to the Treasury, stated in the House of Commons recently that it was not proposed to bring condensers, transformers, valves, and other radio parts under the new import duties.

An Exhibition of Inventions.—An exhibition of inventions was held from June 8th to 13th inclusive at the Central Hall, Westminster, under the auspices of the Institute of Patentees (Inc.). The electrical exhibits were few and most of them were of inventions not on the market. Among those of most interest was a model of a proposed electrically driven propeller intended for use in turning ships in wet dock. The propeller is attached to an electromagnet which is lowered against the side of the ship below the water level; electrical energy is then applied, by means of leads specially prepared for use under water, which both magnetises the electromagnet and drives a small propeller. Under the magnetic influence the base of the device adheres to the ship's side. The rotation of the propeller is calculated to turn the ship in the water.

Another electrical exhibit was a fog and anti-dazzle lamp, for motor vehicle use. This is in a cylindrical form and is so arranged that the light ray can be emitted from the front or rear or from either side for the purpose of obtaining a view at the side of the car, a door number for instance, the interior of the car, or at rear or front of the car. The front lamp is provided with specially constructed reflectors by which it is claimed dazzling effects are eliminated.

A device designed to indicate, by means of an electric lamp, when the rear light (oil) of a car is out was another exhibit. The expansion of a metal bar under the influence of the flame of the lamp breaks the electrical circuit.

Another exhibit was in the form of a display of beautifully coloured high-frequency discharge tubes for sign advertising purposes.

A traffic warner, electrically illuminated; an intermittent electric light fitting; an improved automatic electrically-operated alarm clock, in which the dial is illuminated simultaneously with the operation of the alarm; and a sparking plug which contains a visible gap and can be lifted off its seat while the engine is running to enable the compression escape to clean the points, were some of the other exhibits.

The Chinese Disorders.—The latest news from the Chinese cities affected by the anti-foreign riots shows that the situation is not improving. Last week the list of undertakings suffering from strikes was added to, the companies affected including the Hongkong Tramway Co.

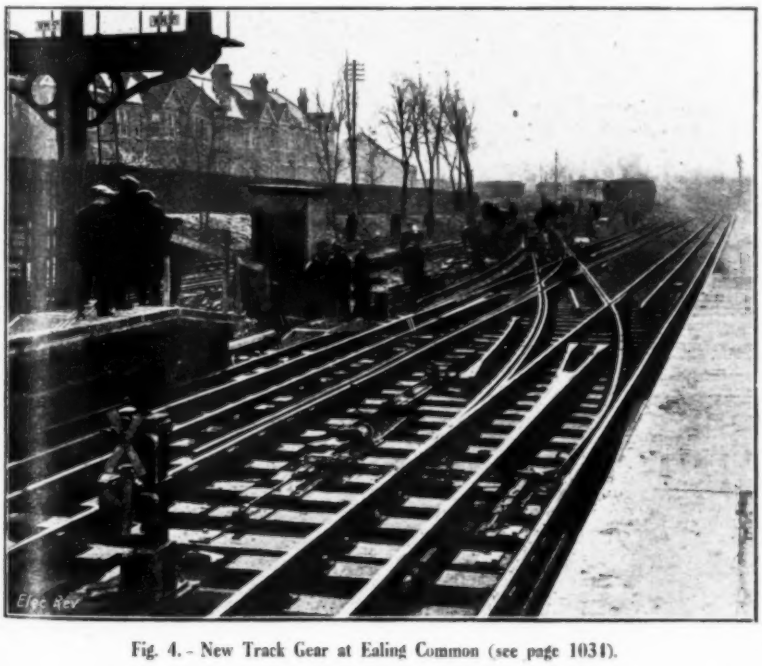


Fig. 4.- New Track Gear at Ealing Common (see page 1034).

Radio Communication with Aircraft.

The Marconi Station at Basle, Switzerland.

THE involuntary flight of the R33 once again demonstrated the value of radio communication for navigational purposes. Its use avoided many hours of anxiety and may be said to have ensured the safety of the airship and her crew. The radio direction-finding stations at Croydon, Pulham, and Amsterdam, took bearings on every message that the R33 sent out, and within two minutes those readings were at Major Scott's command at Pulham.

The success and efficiency of any organised aerial service

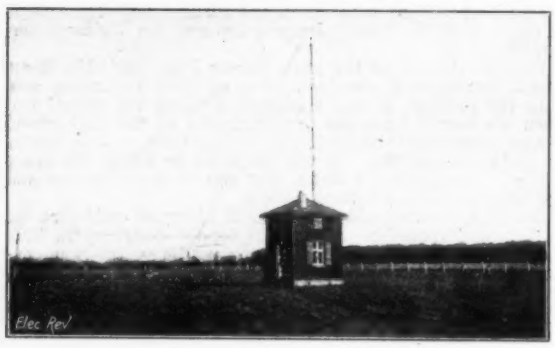


Fig. 1.—Receiving Station at Basle Aerodrome.

depend largely on rapid means of communication between aeroplanes in flight and the air ports, and between the air ports themselves, and the latest aerodrome to be equipped with radio apparatus is that at Basle, Switzerland, which is controlled by the Basle Aviatic Company and is the port of call for several important international air services.

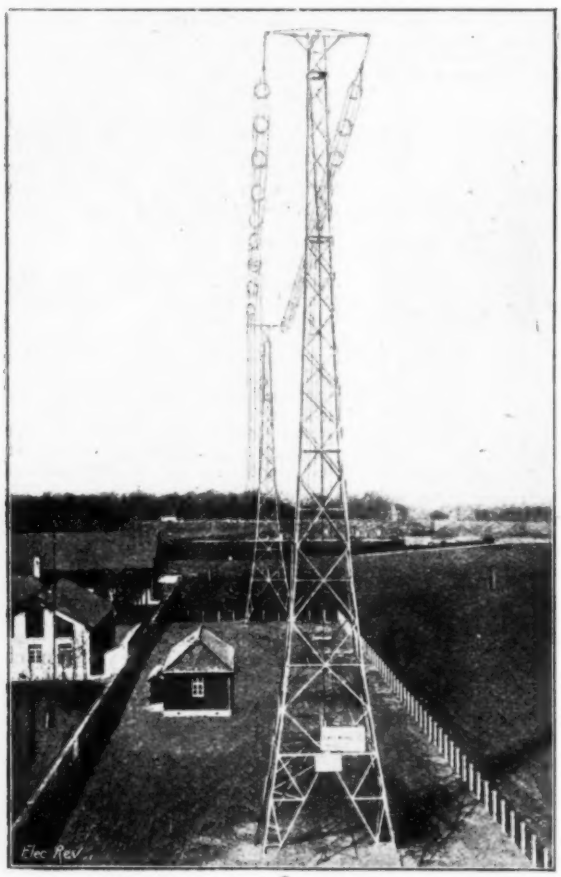


Fig. 2.—Transmitting Aerial at Basle.

The accompanying illustrations show the aerial systems of both the transmitting and receiving stations. The apparatus was manufactured by the Marconi Company, which has also been responsible for equipping the airports at Croydon, Geneva, Brussels, Rotterdam, Cologne, and in Rumania and Greece. The plant is adapted for telegraphy, telephony, and direction finding. The transmitter is a 1½-kW "U" set, which utilises three valves for telegraphic and five for telephonic transmission. The normal range for telephony is about 230 miles, and for aeroplanes the normal telephonic range is from 100 to 150 miles, but instances are on record of aeroplanes having been able to hold conversations with air ports at distances of over 400 miles. Aeroplanes are able to speak to each other while travelling at high speed, under favourable conditions, over an average distance of about 50 miles; in some instances aeroplanes have spoken to each other when as far as 100 miles apart with the aid of Marconi apparatus.

By means of a small switchboard in the receiving room of the aerodrome the operator is able to control the transmitting station at a distance and, if required, can also connect the local telephone system direct to the transmitter. In this way the whole of the radio communication system of the aerodrome, both transmitting and receiving, can be centred in one room under the direct supervision of one official.

New Electrical Devices, Fittings, and Plant.

Readers are invited to submit particulars of new or improved devices and apparatus, which will be published if considered of sufficient interest.

A Small Electric Drill.

An interesting description is given in the *Electric Railway Journal* of a new type of electric drill which is being marketed by the HISEY-WOLF MACHINE CO., Cincinnati, Ohio. This machine, a section of which is shown in fig. 1, weighs 17 lb. and runs at a speed of 525 r.p.m. without load. The armature is hand wound and of the toothed type. The brush holders are provided with adjustable spring tension and are mounted as a separate unit on bakelite yokes, thus permitting ready adjustment. A ventilating fan is keyed to the armature shaft and a suitable vent construction allows the cool air to pass to the commutator and through the motor. The inner races of the

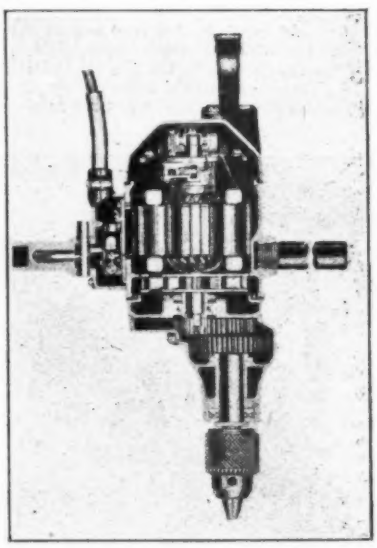


Fig. 1.—Section through Electric Drill.

ball bearings on the armature shaft are locked so that they cannot slip. The gear end bearing is mounted with a floating fit in a hard cast-iron sleeve to prevent binding and reduce friction.

The machine is provided with side handles, which can be removed for close corner work; a spade handle is also arranged on top directly in line with the drill chuck. This eliminates side pressure, reduces friction and produces a saving in drill bits. The spade handle can also be removed for work in close quarters, and pressure can then be applied directly on the end cover casting. The machine is capable of drilling up to ½-in. holes in steel.

The "Kaleeco" Watertight Junction Box.

A novel and effective method of sealing the ends of small metal-sheathed cables, as used in wiring installations, is used in conjunction with the "Kaleeco" junction box which is marketed by MESSRS. CALLENDER'S CABLE & CONSTRUCTION CO., LTD., Hamilton House, Victoria Embankment London.

A disk of special plastic insulating compound (Kalaloid) is pressed to the centre of the metal base, and remains in position by virtue of its adhesive properties. The porcelain cable connectors are then pressed into this compound and the ends of the metal sheaths of the cables just rest on the compound,

fig. 1. A bonding ring and a bridge ring are fitted over the cables, the bridge ring being locked by the slotted pegs projecting from the base and the bonding ring being pressed on the cable sheaths by means of set screws with flat expanded ends which are threaded in the bridge ring. A tight fitting tinned brass collar is then pressed down inside the bridge into the compound, slots being cut to make a fit over the cables. This forms a chamber into which the "Kalaloid" is thoroughly "worked" to completely cover all connections. A final disk of the compound pressed on top of the filled chamber fills the connections and effectively seals the

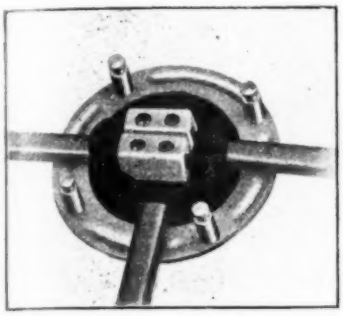


Fig. 2.—Base of Box with the Cables Connected.

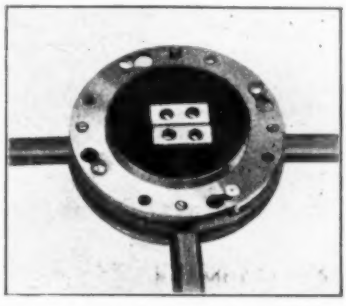


Fig. 3.—The Chamber Filled Before Sealing.

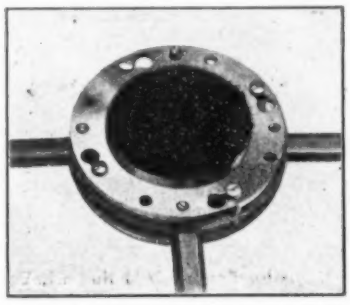


Fig. 4.—The Chamber Sealed.

chamber. Fig. 3 shows the filled chamber before the final application of the compound, fig. 4, after which a metal cover placed over the whole device completes the box.

The makers claim that the compound (Kalaloid) is absolutely damp-proof, that it will remain plastic under all climatic conditions, and that its insulating properties are extremely good. It is supplied in disks, a shade larger than the collar.

A Remote Water-Level Indicator.

The distant water level indicator referred to in the description of the new generating plant at the Tunbridge Wells Electricity Works, published in the ELECTRICAL REVIEW on April 17th, is a patented invention known as the C. & S. remote water level indicator, which was supplied by MESSRS. FERGUSON SUPERHEATERS, LTD., 20, Kingsway, London.

It consists essentially of an actuator chamber, a cylindrical steel casting which is connected to the water drum of the boiler by means of a 1-in. water connection, and a ¾-in. steam connection, so that the rise and fall of the water level in the chamber corresponds to the rise and fall in the boiler. A bronze tube, packed at its upper and lower ends in the manner of an ordinary gauge glass, is fixed through the centre of the actuator. A copper sheath, in the form of a spherical float, is arranged around the tube, with a very slack fit upon

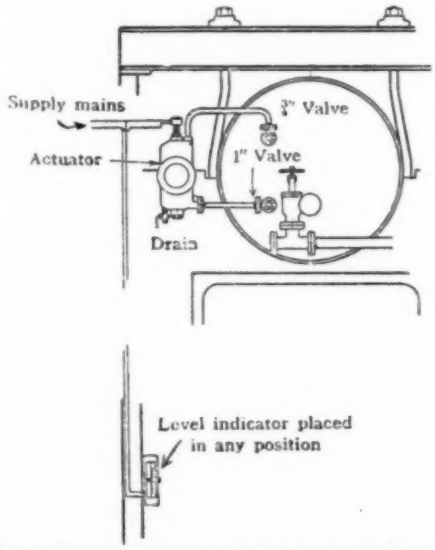


Fig. 5.—Line Diagram of the Remote Water-Level Indicator.

it. A choking coil, connected in series with a resistance to a source of supply, is freely suspended inside the tube, and is arranged so that at low water level the copper sheath embraces the whole length of the choking coil. As the water level rises the metal sheath and the float also rise, thereby lessening the shielding effect upon the choking coil, and consequently varying the back e.m.f. continuously as the float rises to its maximum upper limit, the variation being directly proportional to the variation in the water level. By means of two ordinary cables this e.m.f. variation may be conveyed to an indicator, constructed on the same principles as a voltmeter, any distance from the boiler. The indicator may be in the form of an ordinary indicating instrument or a recording instrument.

The choking coil can be designed for any voltage or frequency, and if it is desired to work off a d.c. supply, an interrupter or a small rotary converter can be supplied. A line diagram of the remote indicator shown in fig. 5.

Automatic Arc-Welding Equipment.

According to *American Machinist*, the GENERAL ELECTRIC Co., Schenectady, N.Y., has developed an automatic arc-welding equipment for quantity-production work on such products as tanks, boilers, &c., where the static load does not exceed 10 lb. per sq. in., and where the metal thickness is at least No. 16 gauge. It is also adaptable for building up under-cut shafts, and similar repair work.

The work-holding fixture is made in each case for the work in hand, the illustration, fig. 6, showing one for welding a longitudinal tank seam. The head is mounted on a channel

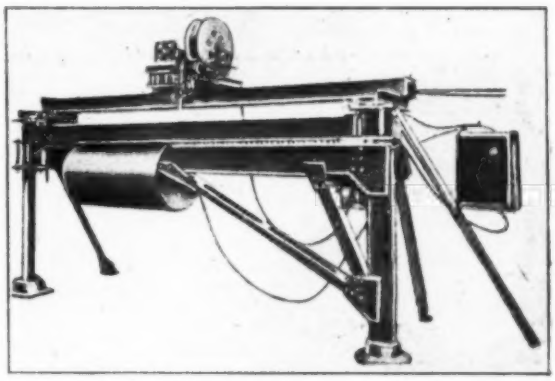


Fig. 6.—Automatic Arc-Welder fitted up for Tank Seam Work.

track above a pivoted work-holding arm. In position for welding as shown, the arm is clamped tightly against the work by means of pneumatic clamps. The fixture illustrated will take care of work up to 10 ft. in length on a minimum diameter of 13 in. and a range in thickness from No. 16 gauge to ¼ in. It is claimed that production can be greatly increased over hand methods by using this machine with two men.

The welding wire is carried on a reel on the head and is fed down automatically by a motor connected across the arc to follow its variations closely. Push-button control is conveniently located for the operator. A complete equipment consists of a head and control panel, a travel carriage, and a clamping device.

The "Arcturus" Soldering Iron.

We have received from M. EDOUARD HIRSCH, 46 rue de Paradis, Paris (Xe), particulars of the "Arcturus" soldering iron, which produces a small arc for the accomplishment of its purpose. The tool is illustrated in fig. 7. The arc is formed between the copper bit and a carbon anode. It is claimed that by the method adopted the weight of the iron is considerably

Fig. 7.—The "Arcturus" Soldering Iron.

reduced—the small size weighs 15 oz.—and that the necessary temperature is reached very quickly. The iron attains 1,100 deg. F. in three minutes in the smaller sizes, and in five minutes in the larger patterns. A special flexible resistance is supplied for use with the iron. This is a simple arrangement, made up in "rope" form, which can be placed in series between the supply wires and the iron. The main advantage of this type of resistance is its great heat-dissipating area.

Legal.

Theft of Post Office Stores.

On June 16th at the Lambeth Police Court, Herbert Smallham, storekeeper, was charged on remand with the theft of bronze wire and lead-cable scrap, valued at £377, from a Post Office Engineers' Department stores at Brixton. Louis Rapoli was charged with receiving the goods knowing them to have been stolen. Both prisoners were found "guilty." Smallham was sentenced to six months' imprisonment with hard labour and Rapoli to three months' imprisonment in the second division.

Commissioners of Inland Revenue v. Sir Charles A. Parsons.

This case came before Mr. Justice Rowlatt in the King's Bench Division on June 17th upon the appeal of the Crown from a decision by the Commissioners. The matter at issue was whether dividends received by Sir Charles Parsons upon shares in Messrs. C. A. Parsons & Co., Ltd., set aside for purchase by the employés of the company, were liable to be assessed as part of Sir Charles's income. The Commissioners held that the dividends were subject to a binding trust in favour of the employés, and on this account were not part of the respondent's income.

Mr. Justice Rowlatt held that whatever was done with the dividends as they accrued, they were subject to taxation. The appeal of the Crown was therefore allowed, with costs.

Trade Union Officials Sentenced.

At Manchester Police Court on June 16th, John William Lomax, of Eaton Mollens, Manchester, and George M'Kay, of Warley Street, Chorlton-on-Medlock, Manchester, pleaded guilty to stealing five small sums of money, totalling £6 5s. 6d., the moneys of the Electrical Trades Union, of which they were secretary and treasurer respectively of the Lorton branch.

Mr. Kenneth Chapman, prosecuting for the E.T.U., said that the thefts had been carried out by the presentation of bogus doctors on which the accused drew unemployment benefits in the names of members, who, as a matter of fact, never received them and were never out of work. Lomax had been employed by the Manchester Tramways Committee for over 20 years. Sentence of two months' imprisonment was passed upon both men.

Correspondence.

Correspondents should forward their communications at the earliest possible moment. No letter can be published unless we have the writer's name and address in our possession.

Installation Practice.

I am an electrical contractor in a small provincial town, and have had my attention called to a power installation now being carried out (concerning plant for a chemical by a local decorator-cum-plumber-cum-electrician, &c., whom, if my information is correct, the borough electrical engineer is acting as consultant.

He, it appears, is giving this firm particulars of the plant to purchase, size of cables, &c., and has personally carried out tests on existing gear to ascertain if it is suitable for the public supply.

As an interested party, it certainly does not seem fair to me that this practice should continue when there are contractors competent and willing to carry out this work already in business.

I should be glad of your readers' opinions on this matter.

Essex.

June 20th, 1925.

Celluloid in Accumulators.

Your article on "Charging Storage Cells in Celluloid Cases," on page 925 of the issue of June 12th, raises an important question.

The writer recalls many years ago an instance where an accumulator, encased in celluloid and left on charge on 110-volt mains, caught fire in the building housing one of the world's finest astro-cameras, then engaged on an astronomical job of the greatest magnitude. The fortunate passing of a gardener, who noticed a bright flare, saved both the instrument and the other enormously-valuable contents of the building.

Many mysterious cases of motor-cars catching fire can only be ascribed to this cause, whilst conversely the use of other materials for accumulator boxes must have greatly reduced claims on insurance companies for "self ignition" under this heading—an indefinite term expressing an attitude of quite unnecessary fatalism!

If celluloid must continue to be used, the non-inflammable variety should certainly be employed. After the carefully recorded experiments of your correspondents Col. G. H. Page and Mr. C. E. Hume, there can be no excuse left for foisting on to the public a material which might fairly be described as inert gun cotton!

Celluloid has other disadvantages in accumulator work, being the cause of acid frothing, which, as your correspondents explain, is the first step towards a breakdown of insulation leading to a fire.

M.I.E.E., M.I.Mech.E., M.I.A.E., &c.

June 20th, 1925.

Artificial Crop Drying.

In the article which you published on June 12th in the present, the author omits to state that the system of hot-blasting which he describes has not yet proved itself in practice or full-sized crops of over 25 tons, such as are usually made in practical farming. Of two small eight-ton stacks made last year by the hot-air system described, one was successful, the other leaving the grass to be cut on the field for some time after cutting—though it was touch-and-go, as the method of construction of the rack was not quite correct. The less said about the other rack the better—it did not produce hay.

I have made full-size racks since 1922. Further, I have previously used pre-heating on experimental stacks, as pre-heating is not novel. I find it is not necessary in most cases to employ pre-heating, though this is dealt with in my patents, except possibly for fleshy crops such as clover and legumes.

Incidentally, an error has crept into the article, as cattle have not as yet had an opportunity of testing both systems against each other at the same time. As a matter of fact the cheaper method, without pre-heating, should produce a slightly better hay.

To sum up, equally good hay could be produced by either method, provided the methods adopted for the cold-air system are adopted in connection with the hot-air way. Questions of technical accuracy of description are, however, of little importance compared with that of the possible economy that may will be obtainable. In practice the best methods will come to the top. So the fact that you again draw attention to artificial crop drying and curing in your columns is of considerable value to the industry.

F. Borlase Matthews.

East Grinstead, June 20th, 1925.

A British Institute of Radio Engineers.

If one reviews the Wireless Societies which exist at the moment and at the same time peruses the wireless and technical Press, one is forced to the conclusion that a really technical society is wanted in Britain, a society which would correspond to the Institute of Radio Engineers of America.

This subject has been talked over between a number of professional men and advanced amateurs, and it has been decided to go right ahead with the forming and registering of such a body. A sufficient number of keen wireless men have agreed to find the necessary capital for registering, and it is the matter through now to ensure lasting success there must be a large membership, so that offices can be secured and good Proceedings issued at not infrequent intervals.

It is intended that the society shall be called the British Institute of Radio Engineers.

The rules and regulations would, as far as possible, be taken from the constitution of the Institution of Electrical Engineers or a similar body.

The classes of membership proposed would be Fellows, Members, Associate Members, Graduates, and students. Entrance would be by examination, after proposal and seconding by not fewer than four Corporate Members or Associate Members.

The body would be a non-technical one, and would deal only with the technical side of wireless. It would not attempt to deal with the constructional side of broadcasting.

An effort would be made to issue Proceedings of value at monthly intervals.

It should be clearly understood that a professional standing would be adopted in all matters, and that the headquarters would eventually be situated in London.

The Society is actually in the process of being registered, so will all those interested or willing to co-operate please send their names either to Mr. F. W. P. Evans, M.I.E.E., 61, Oxford Road, Manchester, or to the writer at an early date, and at the same time indicate the class of membership for which they would apply?

James Nelson, M.I.E.E.

7, High Street, Prescot, *June 20th, 1925.*

Trade with Brazil.

I have read Mr. "P. T. C. E.'s" letter, and while he describes quite publicly in your issue of the 5th inst. as utterly erroneous ramblings, I am quite willing that the readers should judge as to which of the two contains the major amount of ramblings.

I do not think it necessary to discuss the criticisms in detail as they merely missed the object that I had in view when stating them. For instance, I assumed that everyone knew that Brazil was populated by Portuguese, and, of course, they were not referred to as foreign by me; my reference was to the foreigner to Brazil, not including Portuguese, although technically they are so.

I made no claim to help the smaller British manufacturer; my idea was to get hold of some of the large works that undoubtedly will be carried out at some date in the near future. It is usually found that when some big works are carried out by a group such as I indicated they introduce on a large scale

one of manufactured paint other than that previously known locally and this is in itself a good advertisement, not only for the firm carrying out such works, but for the country of origin as well. This again produces further trade in which the other manufacturers have a chance of getting a share.

The heart of the whole thing is that at present we do comparatively very little of the big industrial business for paint in Brazil and this should be changed if possible.

If a group of big manufacturers composing all or most of the different manufacturers of paint needed for railways and tramways, water power, electricity supply, structural steel, machine tools, etc., would form a trading syndicate they could approach the National and Provincial Governments with weight. The concession-monger has been weighed and more often than not found wanting by the powers that be.

The reason so much work of this nature has in recent years gone to the Staates may be the fact that they purchase the greater amount of the principal export of Brazil, viz., coffee.

J. E. Stewart.

Evanesia, *June 26th, 1928.*

Invisible Radiation.

I am very glad to see Mr. J. W. Lyde's communication giving authenticity to the fact that the region of ultra-violet light emitted by a gasfilled lamp is practically the same as in the solar spectrum as measured through the atmosphere.

I have recently obtained evidence from spectrograms of the sun, taken in London, and from aeroplanes at an altitude of 3,000 metres, that the limit of ultra-violet is practically identical. Evidence which Mieke and Lehmann also found many years ago by comparing ultra-violet spectrograms taken in Berlin and on Monte Rosa.

In these days of light treatment a lot of indiscriminate claims are made for such rays as the tungsten-arced carbon supplying the ultra-violet rays which the atmosphere absorbs in England, but which are present in Alpine sunshine, &c.

The tungsten arc emits rays a very evenly distributed band of light extending to nearly 2,000 A.U. thus embracing short ultra-violet rays which are partly bactericidal and to some extent harmful, and parts of polychromatic value, which should not be in my opinion indiscriminately mixed in sunshine treatment.

Mr. Lyde's welcome article adds support to the fact that the best thing we can get to sunshine "Alpine" or otherwise, is the half-watt type lamp with the extreme red and infra-red filtered out—as it can be—to match the solar spectrum as we receive it, the positive crater of a pure carbon arc, which has a good temperature the nearest obtainable to sunlight, is probably better still with proper filtration.

T. Thorne Baker.

Research Laboratories, Imperial Dry Plate Co., Ltd., Wolverhampton, *June 26th, 1928.*

Lecture Courses at Grenoble.

In view of the existence of an exhibition dealing with hydraulic power at Grenoble in the French Alps, it has been proposed to revive the holiday course of lectures on water power and electrical power transmission at the University of that city. Provided a sufficient number of students come forward, the course will be from August 6th to 25th next.

The city is within easy reach of a number of interesting installations, and at the exhibition things are to be seen which would give practical illustration to many matters dealt with.

The lectures, given by men of practical experience, will be in easy French, so that those who have learned French at school should have no difficulty in following them. The course is not intended solely for young students, but those who are under twenty-eight years of age can, by giving notice, obtain tickets at half fares from London to Grenoble.

The fees for the lecture course are low, and a local committee exists to assist students to find accommodation at very reasonable rates. The subjects of water power and transmission of power are of increasing importance in the United Kingdom and British Empire, and therefore a course of about thirty lectures on each subject, with conducted visits to some power stations, should appeal, not merely to many technical college students, but also to some people of more mature years who are not too dignified to combine the acquisition of some useful knowledge with a holiday amid pleasant surroundings.

Shortly after the war, having learned of the long-standing success of the holiday courses in the French language at the Sorbonne University I proposed that a holiday course should be arranged on electrical transmission and water power in what might almost be termed the cradle of French water power. Several courses were given.

The secretary of the Office National des Universités Françaises, 8, Cromwell Gardens, South Kensington, will give every assistance to intending students.

Theodore Rich.

Westminster, *June 22nd, 1928.*

Engineers' Club.—ANNUAL DINNER.—The annual dinner of the Engineers' Club (London), will be held on Friday, October 5th, 1928, at the Savoy Hotel, when the Rt. Hon. Winston S. Churchill, M.P., Chancellor of the Exchequer, will be the guest of the Club.

Urban Passenger Traffic.

Protection for Efficient Tramway Services.

While we are not prepared to go so far as to claim that each municipality undertaking owning its electric tramways should, on each and every occasion, oppose the competition in selected hours of petrol-driven passenger-carrying vehicles, by refusing licences to their owners, we feel that such pressure would be more urgent than the licensing of each and every competitive vehicle regardless of other traffic facts. Of course, people have to be carried to and fro unless they walk. The old-fashioned alternative is not popular hence the transport workers have been in a peculiarly strong position and have wrested from such authorities and others rates of remuneration in excess of those earned by skilled craftsmen. For some of reasons with which we have dealt fully on other occasions, there is at times in some places acute competition of an uneconomic type. Therefore, in defence of the tramway revenues, certain municipalities have in the past refused to license competing bus services. From the refusals have followed appeals to the Ministry of Transport and a defence of the decisions by the Minister of Transport. In the course of a debate in the House of Commons on the vote for the cost of the Ministry, Colonel Ashley said: "I am determined . . . to see that the needs of the general public shall come before any other consideration. . . . I have always endeavoured legitimately to protect local tramway services by trying to ensure that inside a municipal area those outside omnibuses should charge higher fares in the area than the tram does." Some may feel that this pronouncement scarcely goes far enough. The needs of the general public are not merely personal in so far as conveyance between certain points is concerned, but communal, in that consideration must be given to the cost of providing that service, whether that cost takes the form of providing and maintaining roads, or a levy on the rates to meet interest and sinking fund charges.

Fortunately the first interim report of the Departmental Committee on the Licensing and Regulation of Public Service Vehicles, which was issued on the 18th inst., goes a little further than the report in Hansard of the speech of the Minister of Transport which we have quoted. The report on the question of competition concludes: "On the whole, the Committee consider that, in view of the large capital commitments and the heavy expenditure of tramway undertakings, both municipal and private, and in view, too, of their statutory obligations, it would not be unreasonable that they should be afforded in certain circumstances some measure of protection so far as their already local traffic is concerned, and that the omnibuses might be discouraged from conveying passengers stage by stage between points served by the trams, by regulations governing the fares to be charged.

"In the opinion of the Committee the practice which is already being followed in certain instances of fixing a fare in excess of the corresponding tramway fare for any journey on that part of the omnibus route which coincides with the tramway route is open to a maximum of objection, where it is properly applied, and they therefore recommend its adoption in all cases where there are adequate grounds for the protection of a tramway undertaking, unless the result would be the charging of unreasonably high fares to the omnibus passengers, in which case they consider that it will not in normal circumstances be in the public interest that the tramway undertaking should be protected.

At this point the Committee proceed to qualify and illustrate their views by suggesting that "the tramway may, for example, be unable to operate at fares equivalent to those which would be charged by the omnibuses, and the establishment of an express fare over and above the tramway fare would result in the public having to pay exorbitant rates. It is, indeed, only intended to protect in certain circumstances an efficiently worked and economically managed tramway system capable, unaided, of affording at all times adequate service to the public dependent upon it." Frankly, we do not expect any municipal tramway committee to be satisfied with this reservation. The expression "fares equivalent to those which would be charged by the omnibuses" suggests to us that the Departmental Committee have never really considered the economics of the urban transport problem. In some cases lower fares can be claimed by a motor-bus company simply because of the disguised subsidy it receives compared with the undisguised burden of road surface maintenance and the local rates levied on the track which are borne by the tramway undertaking. We submit that it would have been more equitable to have said "fares equivalent to those which would be charged by omnibuses *after adding the proportionate costs of road maintenance and contributions to rates.*" Or, again, some tramway managers undoubtedly hold that really efficient working is impossible with dead-end termini, and that economic working necessitates the use of trolley omnibus services as feeders until traffic density warrants the laying of tracks.

Consideration is due to part of the final paragraph on this subject, which reads: "Many of the considerations applicable to tramway services do not differ in principle when applied to trolley vehicle services, and the Committee's recommendations apply equally to both. They consider, however, that a Licensing Authority operating an omnibus service should be regarded merely as if it were an existing licensee, and

should not be allowed any form of protection or preferential treatment for its own service. It is hoped that if some measure of protection is given to the tramway and trackless trolley undertakings in boroughs and urban districts, objection will not be raised to the provision of adequate omnibus services to and from the centres of such built-up areas and the surrounding rural areas which are in need of facilities for traffic movement."

Two more extracts may be left to speak for themselves—our readers can reconcile these with the other statements quoted. In Section 90 the Departmental Committee declares: "The undertaking by a licensee of an obligation to work a service at regular intervals must carry with it as compensation the right to work that service without interruption or disturbance such as is caused by the irregular incursions of irresponsible carriers." This follows immediately upon the words: "having regard to the necessity that those who are engaged in providing transport facilities, if they are to continue efficiently and progressively, should receive a reasonable profit after meeting their working expenses and after making provision for the renewal and replacement of their vehicles in due course." Some of our readers may conclude, perhaps, erroneously that what the Departmental Committee regards as sauce for the motor-'bus goose it considers to be unsuitable for the tramway gander. Our readers can reflect upon the fact that while the former is entitled "to a reasonable profit" without regard to road upkeep, for the latter "it would not be unreasonable that they should be afforded in certain circumstances some measure of protection." As the Ministry of Transport "is going to try to hold an even balance between the two," it is clear that any suggestion that the declarations of the Committee are not harmonious is due to an unfortunate misapprehension by the advocates of the tramways.

The Rumanian Electrical Market.

THE use of electricity is not yet very widespread in Rumania and only a few large power stations are in existence, the principal being at Bukarest and on the oil fields—at Campina and Ploesti. There is, however, an active movement towards electrification, and numerous surveys have been made with a view to the utilisation of the water power of the Carpathians, notably in Transylvania. A French official report from which the foregoing remarks are taken states that in supplying the present and future electrical needs of the country, Rumanian manufacture may be disregarded, as it is virtually non-existent. It is true that about two years ago one company started the production of electric motors, but only in very small quantities and to special orders. The chief outlet for electrical apparatus is the oil fields. Each well requires a boring equipment, including an induction motor with protected slip rings and resistances, and a petroleum extracting equipment with motor and starting transformer. The capacity of the boring motors varies considerably as it depends upon the speed of penetration as well as the nature of the ground. For the standard Canadian outfit 75 h.p. is sufficient but for hydraulic boring 110-140 h.p. is necessary. In view of the special conditions under which the motors have to run, they must be capable of standing 100 per cent. overload; they must show little sign of overheating even at reduced speed and must work easily at 10 to 15 per cent. above the normal voltage. It must be possible to effect a reduction of 50 per cent. or more in the normal speed when the boring tool encounters difficult ground. The slip rings should be tightly enclosed in a steel case fitted with a special fastening device to prevent the drillers from opening it during operations.

To meet the unusual conditions special types of controllers should be supplied. They should be designed for starting, speed regulating, and reversing, possibly in rapid succession and in an atmosphere charged with gas and inflammable dust. They should be of the oil-break type and securely fastened. The motor equipment should include, in addition to the controller, a set of resistances contained in the frame, on the upper part of which a thermostat must be fitted in conformity with the Rumanian regulations, thus ensuring that when the temperature of the resistances reaches 150 deg. C. the current will be cut off. The capacities of the motors chiefly in request are 75 h.p., 100 h.p., and 140 h.p.; voltage 550, frequency 50 cycles, speed 750 r.p.m. For lighting, oil transformers are employed of 1 kVA, 1.5 kVA, and 3 kVA, 500/110 V. The wiring employed must be particularly proof against damp and corrosive gases.

The principal use of electricity apart from the oil fields is in Bukarest, where the motors chiefly utilised are of the 3-phase induction type, 50 cycles. The lamps supplied should be made for 120 V. There is a fair demand for the usual capacities of motors in other parts of the country, the pressure being from 120 to 140 V direct or alternating, the electric power stations not having been always under the control of the State Technical Council as they are at present. Out of a total importation of electrical material amounting to 2,370 tons in 1922, 984 tons were supplied by Germany, and only just under 7 tons by France. It is necessary to maintain stocks in the country because the Rumanian purchaser will wait until the last moment before placing his order even though it may cost him more.

Published Specifications.

Compiled expressly for this journal by Patent Agents.
The name of the applicant's patent agent, if any, will be found on the printed specification.
The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1923.

29,551. "Alternating-current signalling systems." F. E. Pernot. November 28th, 1923. (234,529.)

30,189. "Illuminating devices for simulating daylight." A. R. St. Clair. November 30th, 1923. (234,530.)

1924.

1,864. "Electric asynchronous cascade-connected machines." Sachsenwerk licht-und Kraft Akt. Ges., W. Sarfert, and L. Hart-Wagner. January 23rd, 1924. (234,532.)

2,664. "Mounting of electrodes in electrical discharge tubes." W. R. Buckmore. February 1st, 1924. (234,537.)

5,186. "Head bands for telephones and like instruments." C. Terry. February 27th, 1924. (234,553.)

5,187. "Construction and use of electromagnetic relays." Siemens Bros. and Co., Ltd., and E. R. Garrod. February 29th, 1924. (234,555.)

5,188. "Automatic and semi-automatic telephone systems." Siemens Bros. and Co., Ltd., and D. A. Christian. February 29th, 1924. (234,556.)

5,886. "Condenser microphones." H. Meusser. March 8th, 1923. (212,576.)

5,908. "Manufacture of vacuum electric tube devices having electron-emitting cathodes." E. Y. Robinson and Metropolitan-Vickers Electrical Co., Ltd. March 7th, 1924. (234,565.)

6,137. "Electric motors and switchgear therefor." J. G. Stirk. March 11th, 1924. (234,566.)

6,611. "Variable inductances." L. H. Bainbridge-Bell and Radio Communication Co., Ltd. March 13th, 1924. (Cognate applications 12,203/24 and 13,587/24.) (234,570.)

6,612. "Electric vehicles." R. Brooks and Metropolitan-Vickers Electrical Co., Ltd. March 13th, 1924. (234,571.)

6,674. "Electric switchgear." British Thomson-Houston Co., Ltd., H. C. Heath, and C. W. Wood. March 14th, 1924. (234,573.)

6,855. "Electric switches." J. Stone & Co., Ltd., and A. H. Darker. March 17th, 1924. (234,574.)

7,018. "Thermionic valves or electron-discharge tubes." L. A. Levy. March 19th, 1924. (234,576.)

8,459. "Method of winding of inductance and like coils for wireless and electrical apparatus." W. H. Thornton and F. Thornton & Co. April 3rd, 1924. (234,587.)

8,841. "Audible indicating device for excess electric currents." J. E. Brown, E. G. Anness, and W. Meacher. April 8th, 1924. (234,592.)

11,590. "Wireless aerials." F. R. R. J. Pearce. May 10th, 1924. (234,621.)

12,480. "Reclosing circuit-breaker systems." British Thomson-Houston Co., Ltd. August 7th, 1923. (220,276.)

13,003. "Spaced self-supporting electric coils." E. G. Hake. May 27th, 1924. (234,635.)

14,235. "Electromagnetic brakes." N. E. North and Metropolitan-Vickers Electrical Co., Ltd. May 29th, 1924. (234,637.)

14,640. "Pupinised lines for telephone transmission over long distances." Siemens & Halske Akt. Ges. October 5th, 1923. (222,829.)

14,641. "Pupinised lines for telephone transmission over long distances." Siemens & Halske Akt. Ges. November 27th, 1923. (Addition to 222,829.) (223,006.)

15,333. "Combined electric protective relay and indicator." British Thomson-Houston Co., Ltd. (General Electric Co.). June 2nd, 1924. (234,654.)

16,116. "Electric connections particularly adapted for electric heating units." British Thomson Houston Co., Ltd. July 6th, 1923. (218,673.)

16,508. "Electric starters for internal-combustion engines." K. A. Barenyi. July 9th, 1924. (234,660.)

16,789. "Systems of electric distribution." British Thomson-Houston Co., Ltd. July 13th, 1923. (219,025.)

18,020. "Trolley heads for electric tramway and railway vehicles." J. Stone & Co., Ltd. (L. Ralston). July 28th, 1924. (234,666.)

18,912. "Oil-break switches." Sachsenwerk Licht-und Kraft Akt. Ges. October 11th, 1923. (223,197.)

19,025. "Operating and controlling systems for alternating-current vapour-electrical devices." A. E. Alexander (Hanovia Chemical & Manufacturing Co.). August 11th, 1924. (234,675.)

19,233. "Thermo-electric controlling devices." British Thomson-Houston Co., Ltd. August 13th, 1923. (220,645.)

20,275. "Dynamo-electric machines." British Thomson-Houston Co., Ltd. August 31st, 1923. (221,214.)

21,311. "Electric switches." E. C. R. Marks (Hart Manufacturing Co.). September 5th, 1924. (234,684.)

21,981. "Electrically-propelled vehicles." Edison Accumulators, Ltd., and J. F. Monnot. September 17th, 1924. (234,687.)

22,770. "Electrical sparking plugs." M. L. Hofmann-Hurner. September 26th, 1924. (234,691.)

24,587. "Electric switches." Johnson & Phillips, Ltd., and H. G. Bailey. October 6th, 1924. (234,695.)

25,784. "Electrical contacts." British Thomson-Houston Co., Ltd. October 30th, 1923. (224,230.)

26,017. "Dry cells or batteries." M. Markiewicz and W. Romer. October 31st, 1924. (234,701.)

26,417. "High-frequency signalling systems." British Thomson-Houston Co., Ltd. November 6th, 1923. (224,338.)

26,529. "Electrically-controlled fluid-pressure brakes." Compagnie Internationale des Freins Automatiques Soc. Anon. November 10th, 1923. (224,338.)

27,141. "Electrical condensers and method of manufacturing the same." W. R. Respess. December 22nd, 1923. (226,506.)

27,191. "Collapsible and adjustable reels for the manufacture of wire ropes and electric or other flexible cables." G. Pyburn and A. Jack. November 14th, 1924. (234,702.)

27,770. "Electric catchers and conveyors for metal sheets." W. A. Fitzsimmons. December 4th, 1923. (225,837.)

27,796. "Keying or transmitting apparatus for high-frequency signalling systems." British Thomson-Houston Co., Ltd. November 21st, 1923. (225,224.)

28,385. "Insulating gloves or the like articles." St. Helens Cable and Rubber Co., Ltd., and H. C. Harrison. November 27th, 1924. (234,716.)

28,864. "Electrical apparatus for heating rivets, bolts, and the like." E. Schroder. December 2nd, 1924. (234,719.)

1925.

1,372. "Construction of disinfecting appliance for use with the mouthpieces of telephone and like transmitters." H. R. Soar. January 16th, 1925. (234,740.)

2,205. "Headlamps." British Thomson-Houston Co., Ltd. January 26th, 1924. (228,180.)

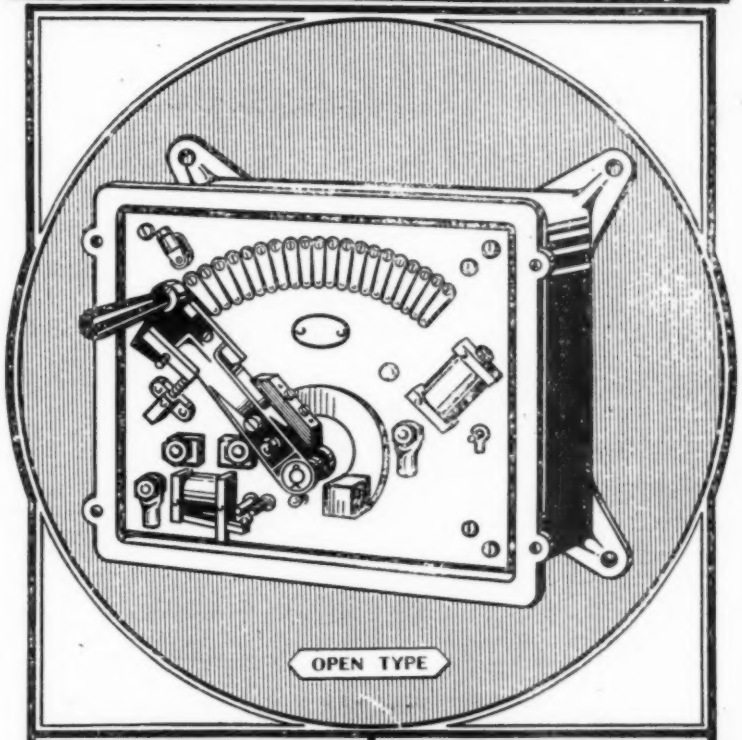
3,060. "Electrically-controlled pendulums." B. J. X. Gosselin. February 6th, 1924. (228,898.)

3,433. "Electron-discharge tubes for generating or amplifying electric currents." Naamloze Vennootschap Philips Gloeilampenfabrieken. February 9th, 1924. (228,935.)

3,582. "Electrical measuring and recording instruments." C. E. Foster. February 9th, 1925. (234,751.)

6,985. "Radio receiving systems." Soc. Francaise Radio-Electrique. March 15th, 1924. (230,854.)

VERITYS
D.C. MOTOR STARTERS.



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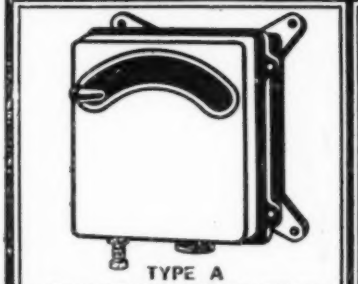

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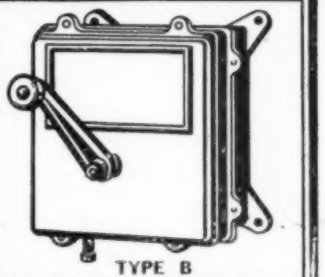

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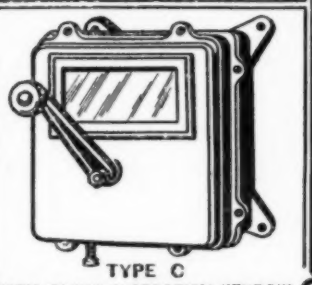

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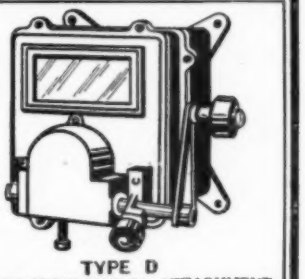

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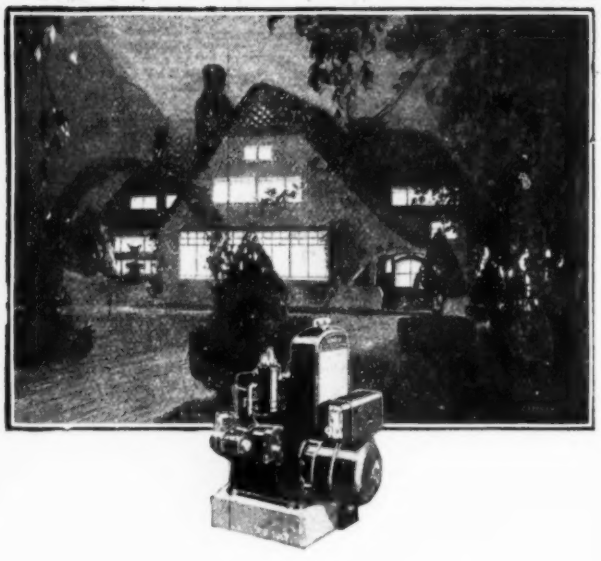

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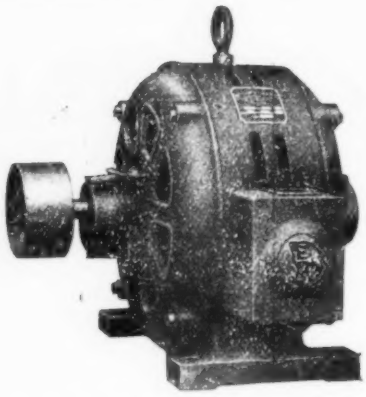

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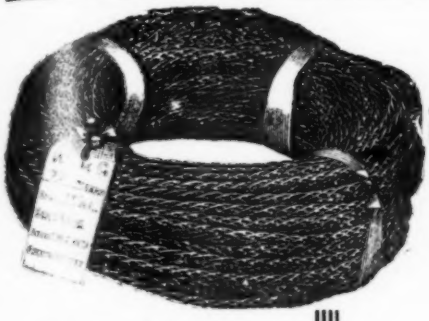

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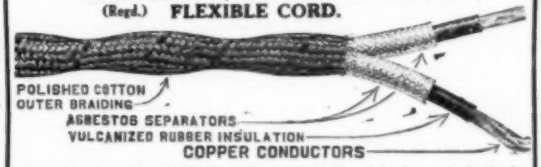

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'Blackley" *gives you greater length per given weight.*
Sticks better.
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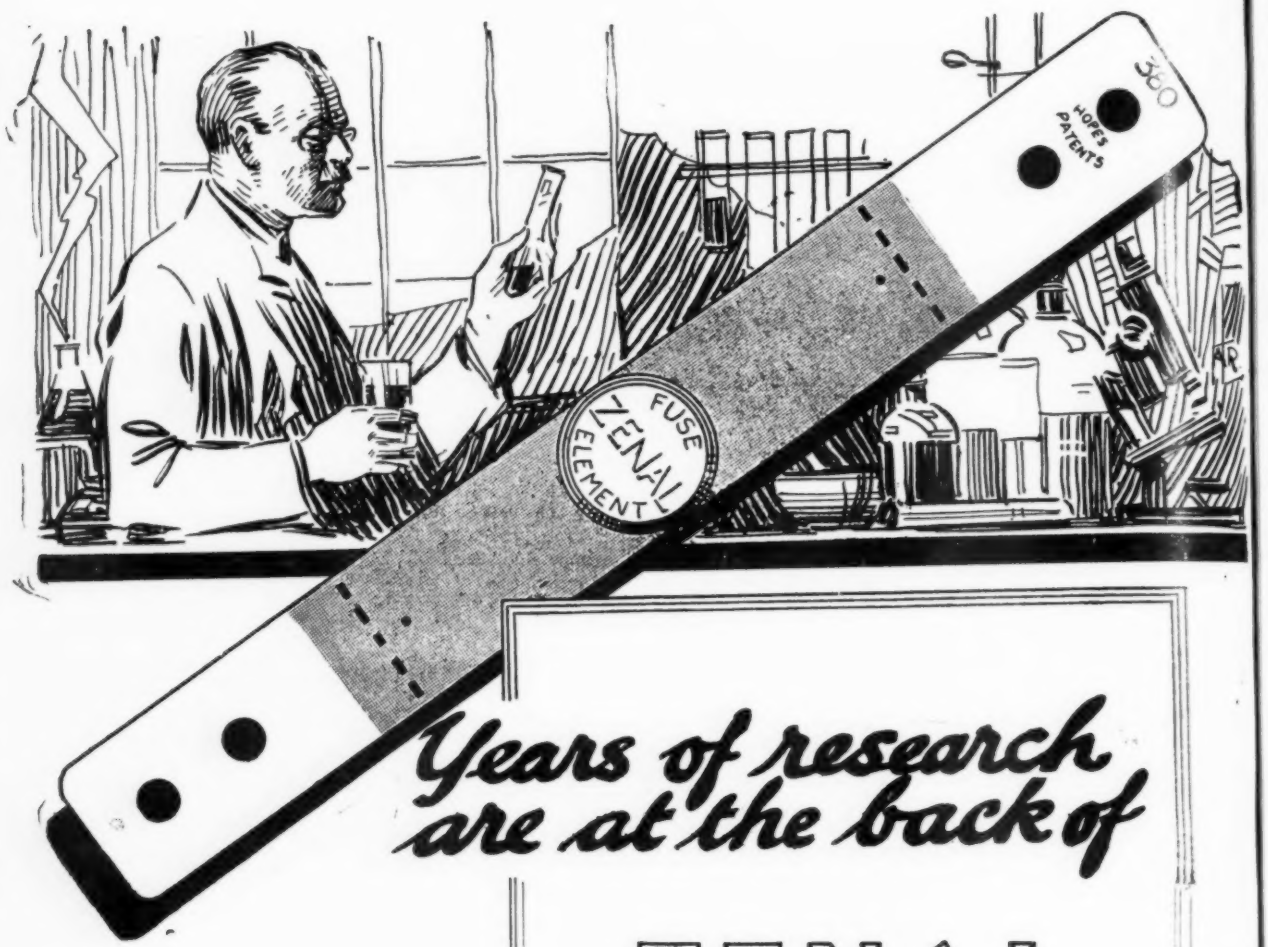

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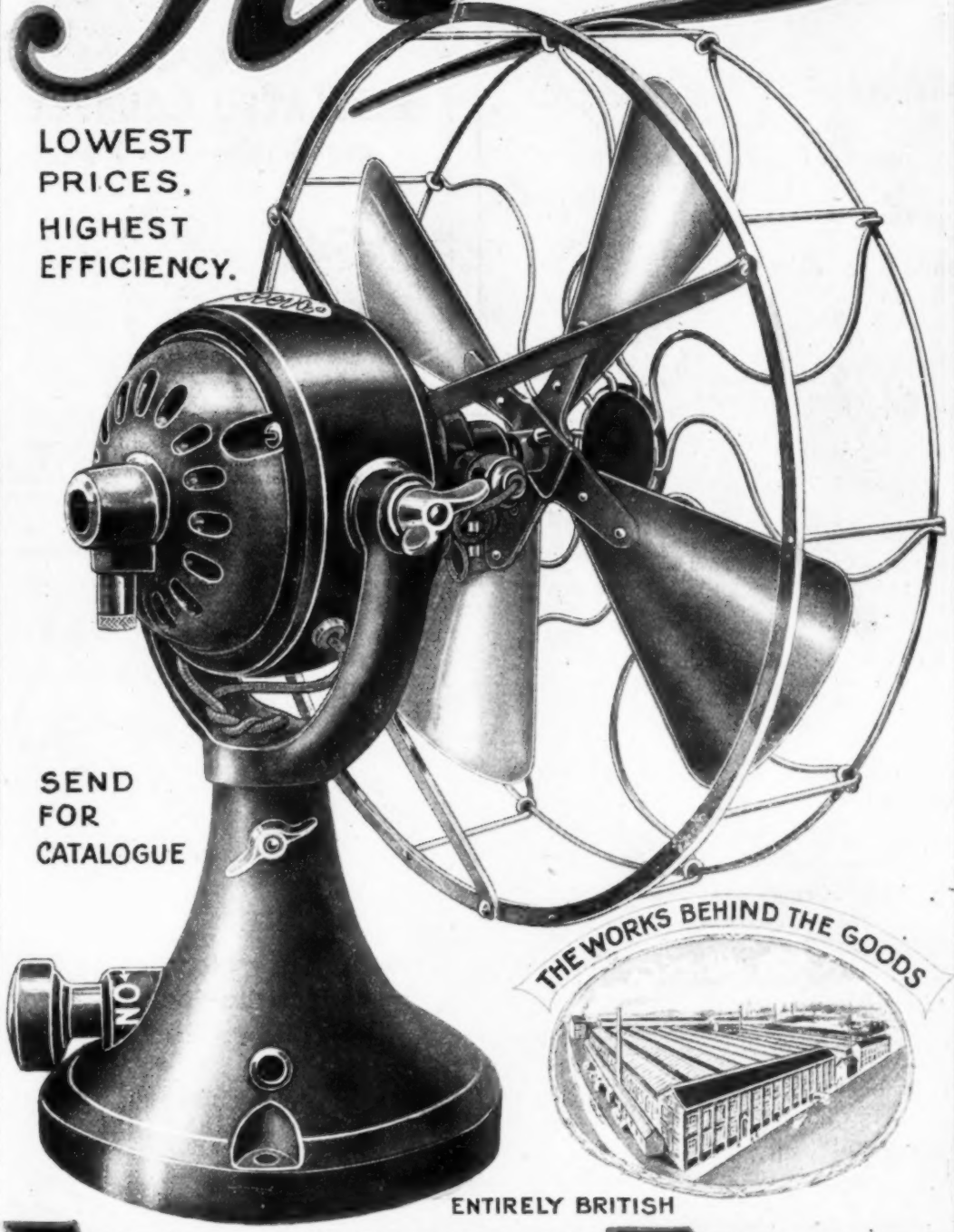

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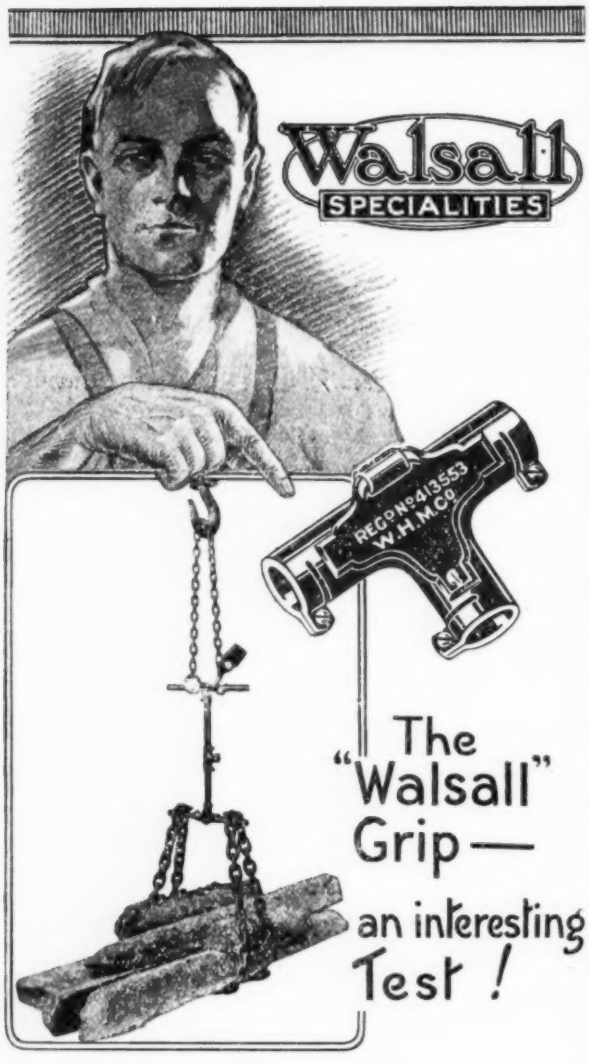

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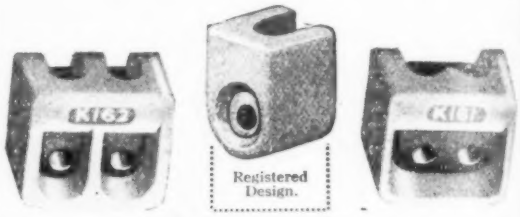
INSULATED CONNECTORS
specially designed for the purpose



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LAST WEEK—
THE "ADJUSTABLE"
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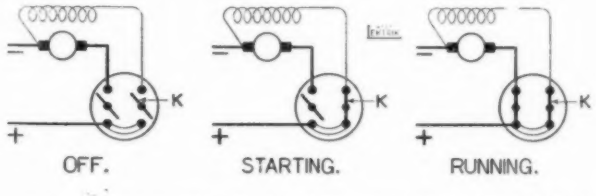
Patent 232,422.

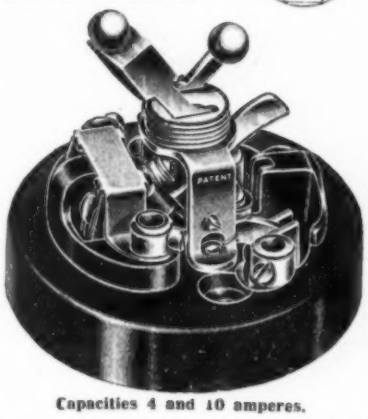
A "TWINOB" SWITCH ADAPTATION.

The illustration shows one of the many adaptations of our "Twinob" Switch.

(A somewhat similar construction for the control of A.C. Single-Phase motors was shown in our advertisement of June 5th)

The object of the present arrangement is to allow for movement of the outer knob **before** the one it encloses, and to ensure that both knobs return to their "off" positions together.





Capacities 4 and 10 amperes.

The diagram shows one application for the control of a Shunt Motor, where K represents the outer (or first-actuated) knob which controls the Field, thus allowing excitation before the Armature circuit is closed.

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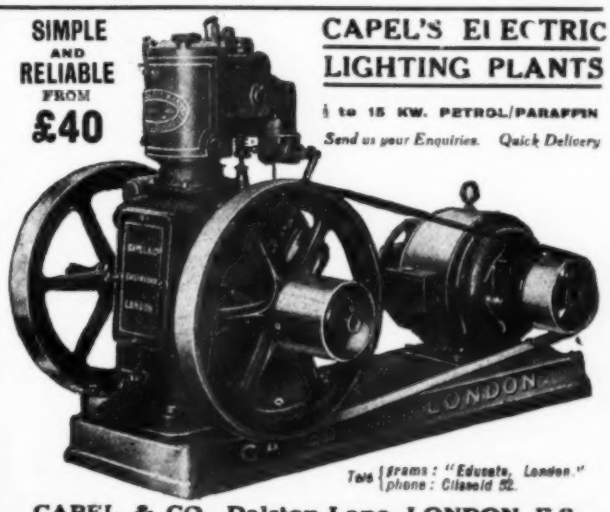

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The One of J&P Pages

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As the Warrior of the Olden Days was effectually protected by his coat of mail so, similarly, and for the same reason is the

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immune from the damage which dust, damp, hard knocks and rough usage would otherwise entail.

The bulk of the Switchgear employed in industrial service needs this armour!

The user knows, as well as we do, the conditions of its use—

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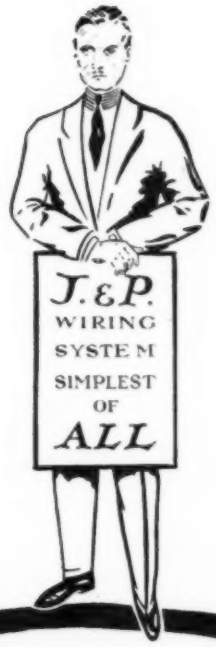

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J. & P. WIRING SYSTEM

—merits which make for extreme ease of manipulation and fixing, wonderful economy and the highest standard of electrical efficiency.

It is these merits you should describe and demonstrate!

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Let us help you in your approach.

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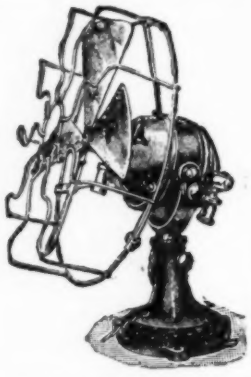

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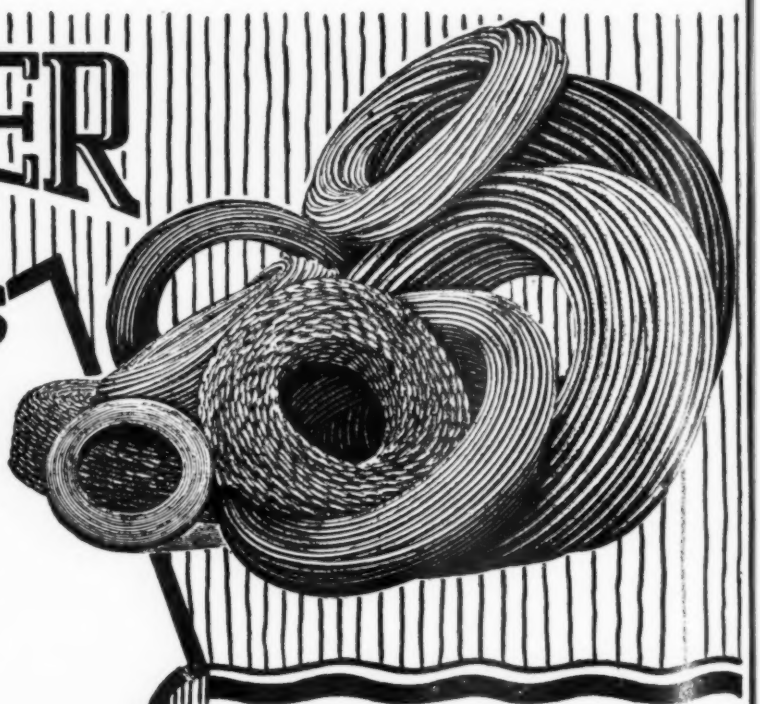

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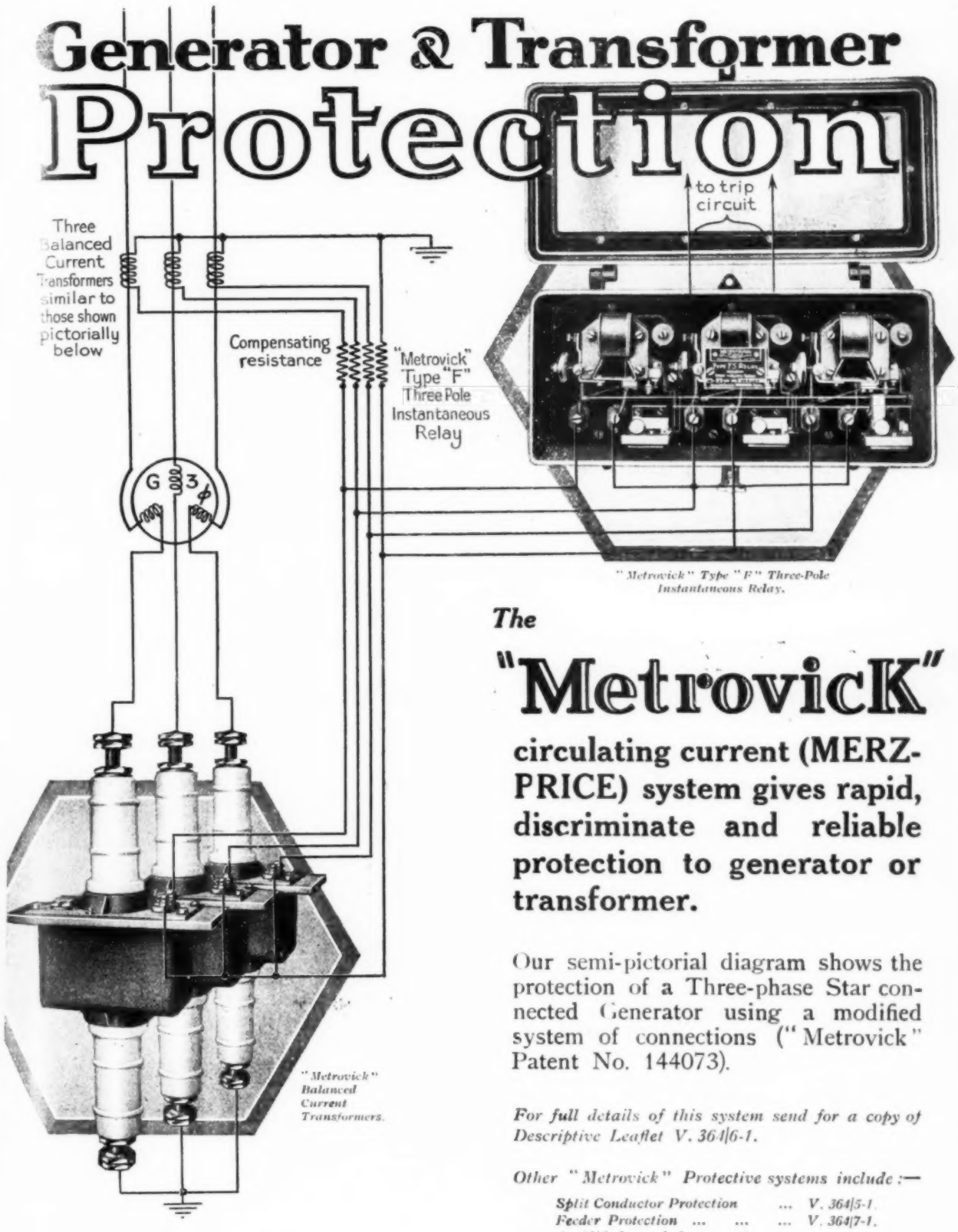
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Compensating resistance
"Metrovick" Type "F" Three Pole Instantaneous Relay
to trip circuit
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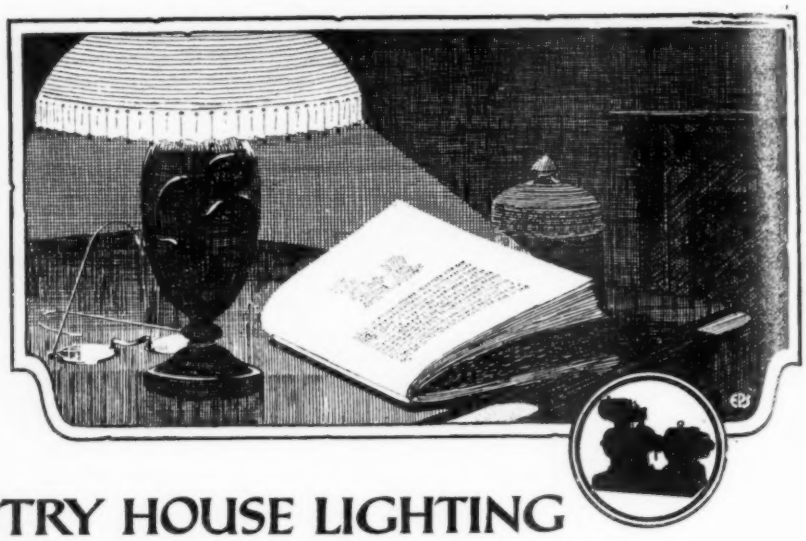

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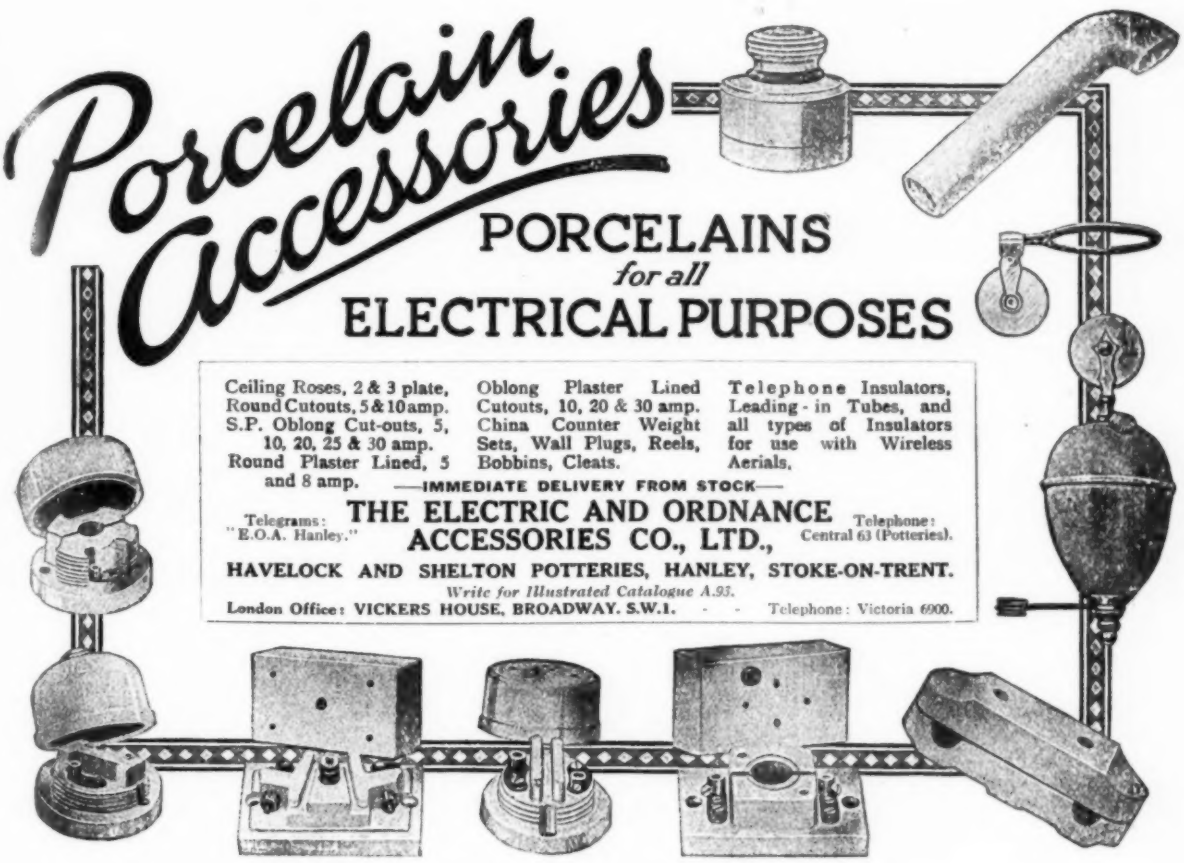

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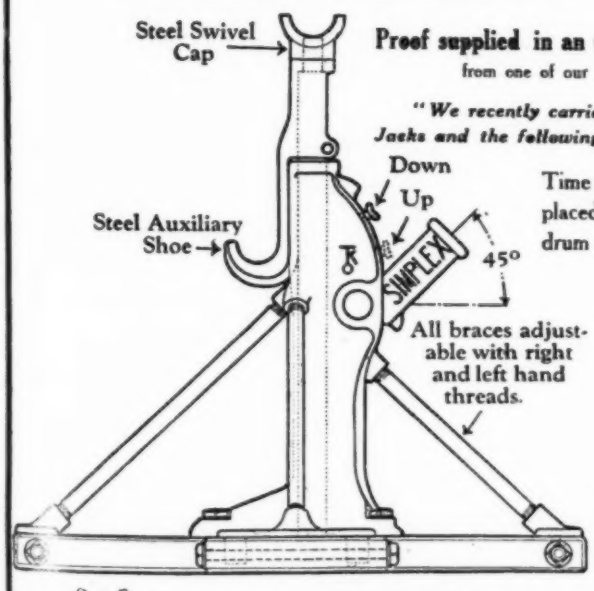

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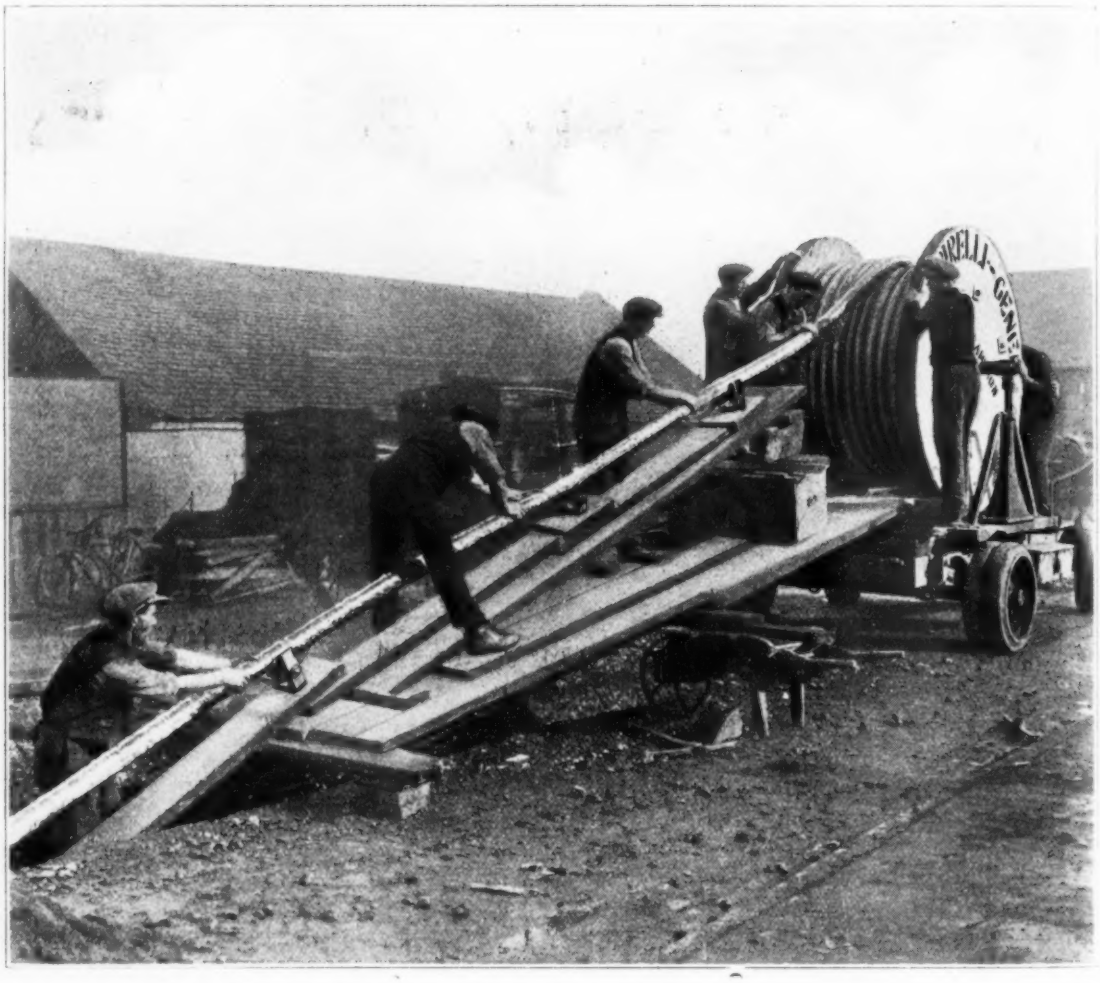

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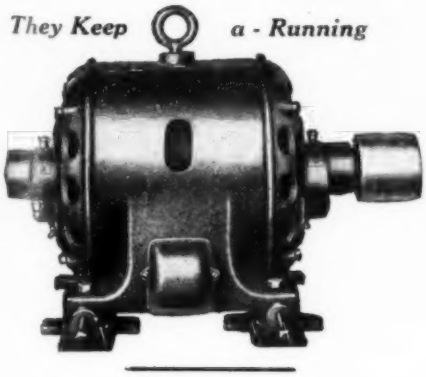

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These are just a few of the reasons why many Century Motor owners report continuous service for 20 years without a single bearing replacement.

Built in all standard sizes from 1/8 to 40 H.P. temperature rise not more than 40 degrees Centigrade.

SEND FOR BULLETIN No. 29.

Bulletin No. 29 outlines all the superior features of Century Repulsion Start Induction Single Phase Motors send for your copy to-day.

CENTURY ELECTRIC COMPANY

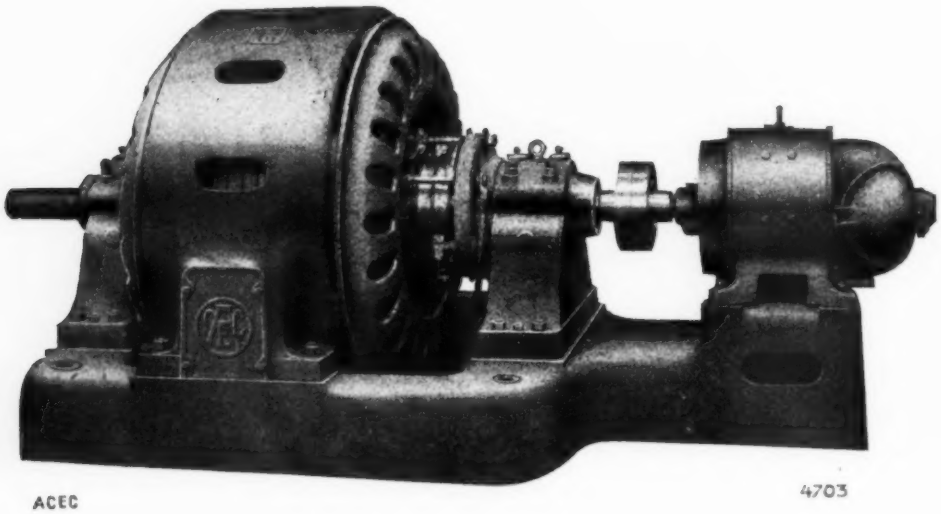
1827, Pine St. **St. Louis, Mo.**

29 Stock Points in the United States and more than 50 Outside Thereof.

1/8 to 40 H.P. Century MOTORS 1/8 to 40 H.P.

A·C·E·C·

ATELIERS DE CONSTRUCTIONS ELECTRIQUES DE CHARLEROI



ACEC 4703

A·C·E·C· Synchronous Induction Motors

The A.C.E.C. are manufacturers of all classes of electrical machinery and cables.

HIGH Power Factor is of the greatest importance in all supply systems, and it is found in an increasing number of cases that the installation of Synchronous Induction Motors is the most efficient and economical means of improving the power factor.

The design of the A.C.E.C. Synchronous Induction Motor is based on extensive experience in the manufacture of this type of machine. We are in a position to quote highly competitive prices and we shall be glad to submit proposals for their installation.

ATELIERS de CONSTRUCTIONS ELECTRIQUES de CHARLEROI

LONDON OFFICE 56 Victoria Street · S.W.1

TELEPHONE - VICTORIA - 3662 — TELEGRAMS - EDEMPAIN · SOWEST · LONDON

CABLES : EDEMPAIN : LONDON
CODES · A·B·C· 5ed · ENGINEERING. LIEBERS.

Telephone: REGENT. 2101. 2102.

Contractors to the ADMIRALTY, WAR OFFICE, POST OFFICE, INDIA OFFICE, ETC ETC

Telegrams: SAXATILE, PHONE, LONDON.

HIGH GRADE BELL ACCESSORIES
Specialists in
ELECTRIC BELLS.
RELAYS.
INDICATORS.
FIRE ALARMS
BURGLAR ALARMS
BATTERIES.

ESTABLISHED 1855

JULIUS SAX & COMPANY LIMITED

WHOLESALE ELECTRICAL MANUFACTURERS,

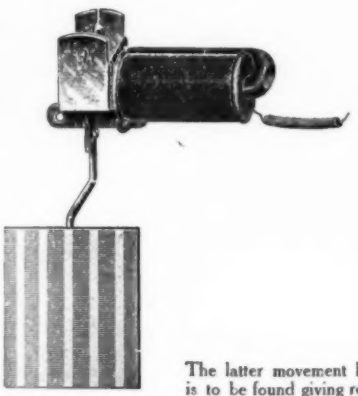
HIGH GRADE LIGHT ACCESSORIES
Specialists in
WALL PLUGS.
PLUG ADAPTORS.
LAMP HOLDERS.
CANDLE FITTINGS.
HOLOPHANE GLASS AND FITTINGS.

24a High Street, New Oxford Street, London, W.C.2.

ELECTRIC BELL INDICATORS

STOCKED IN ALL SIZES.

PENDULUM, MECHANICAL, ELECTRICAL REPLACEMENT.



The latter movement has been used in conjunction with the famous SAX BELL for over 50 years, and is to be found giving reliable and efficient service in numerous Fire and Police Stations, Banks and Municipal Buildings. If you are desirious of installing Indicators that will insure permanent service and give entire satisfaction, write for particulars.

EFFICIENCY AND RELIABILITY.

The efficiency and reliability of an Electrical Installation are to a great degree dependent upon the choice of proper fittings and accessories. The name of SAX has been for over half a century associated only with the highest grade Electric Bell Fittings and Accessories, and is recognised to-day as it was 50 years ago as being synonymous with quality.

Established 1855.

***WORKING WIRING DIAGRAM** will be submitted on application for any Bell, Burglar or Fire Alarm Installation without obligation.*

PLENTY STATIONARY OIL ENGINES

OF British design and construction throughout. Plenty Oil Engines form an ideal motive power for such undertakings as Electric Supply Stations and Generating Plants for Ships, etc.

They combine the advantages of the Semi-Diesel without the disadvantage of the Hot Bulb—the reliability of the Diesel without the disadvantage of air-injection and high compression.

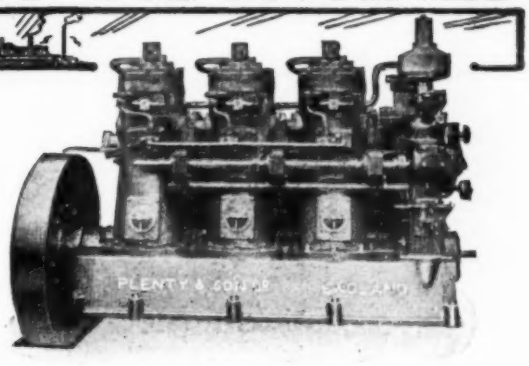
The 1925 models have numerous important improvements.

Full particulars of Plenty Engines will be forwarded free upon request.

PLENTY & SON LIMITED

KING'S ROAD WORKS, NEWBURY, - BERKS.

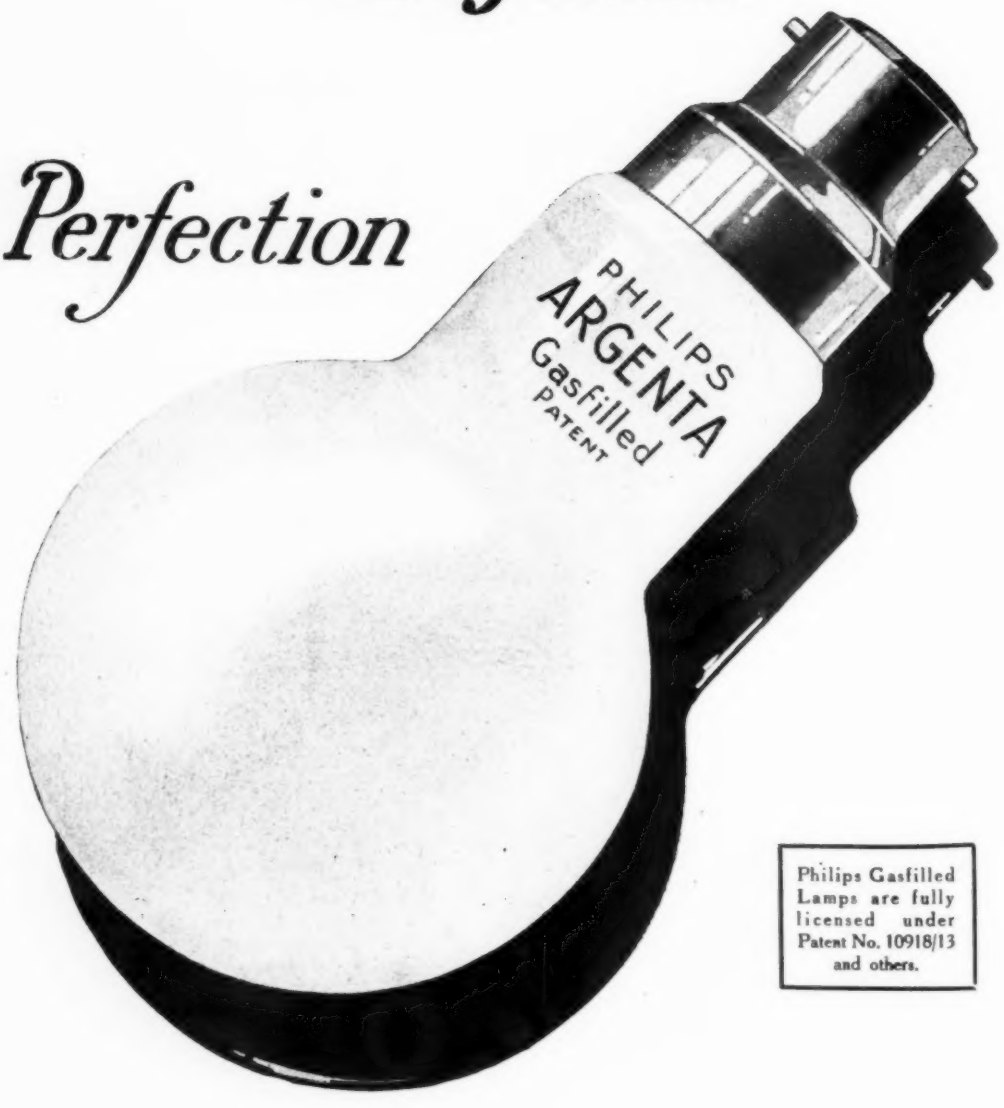
Telephone: Newbury 7. Telegrams: "Plenty, Newbury."



3P50 150 B.H.P. Engine.

PHILIPS
Argenta

Perfection



Philips Gasfilled Lamps are fully licensed under Patent No. 10918/13 and others.

PHILIPS LAMPS LIMITED.

60 WILSON STREET, FINSBURY SQUARE,

TELEPHONE NO.: LONDON WALL 2037 (3 LINES).

LONDON·E.C.·2

TELEGRAPHIC ADDRESS: "PHILLAMPS," FINSQUARE, LONDON.

KING STREET WEST (2 & 3, LOFTHOUSE COURT), MANCHESTER.

BALTIC CHAMBERS, 102, HOLM STREET, GLASGOW, C.2.

30, THE HANDYSIDE ARCADE (PERCY STREET), NEWCASTLE-ON-TYNE.

UNIVERSAL

70 YEARS'

Manufacturing Experience is behind the "Universal" guarantee.

No. E 97 "Universal" Range is listed at the very low price of £18 with two boiling rings—£20 with three rings, or £30 for the "De Luxe" model No. 193.

The "double" 2-year guarantee on the boiling rings insures against the old troubles.

"Universal" hot plates do not break down and are NOT a continuous source of trouble.

Full details on request.

THE TRADE MARK KNOWN
UNIVERSAL
IN EVERY HOME

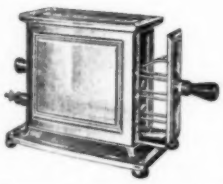
TROUBLELESS

Boiling Rings cut out

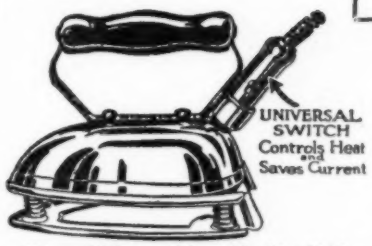
GAS

Arguments.

They won't break down ! !



The new "Universal" one-minute Oven Toaster - both sides at once. 37s. 6d. subj.



"Universal" Irons sell from 17s. 6d. subj., 4 or 6 lbs.—guaranteed. Test for test recognised the best.

"Universal" Standard Toaster No. E 946 at 26s. 3d. subj., defies ALL competition

Branches:
GLASGOW: 97, Douglas Street, St. Vincent Street.
CARDIFF: 11, Windsor Place.

L. G. Hawkins & Co. LTD.

Head Office:
30/35, Drury Lane, Kingsway,
LONDON, W.C. 2.

DO YOU SUPPLY HOTELS, BOARDING HOUSES, SEASIDE APARTMENTS?

THEN YOU SHOULD CERTAINLY ORDER

EXCELSIOR SHADES

PRICE RETAIL **2/11**

There are thousands of customers waiting to buy for the Dining or Drawing Rooms—The Lounge Bed Rooms and Breakfast Rooms, all and more of these positions suggest the wonderful scope for sales.

The rapid development of Electric Light in every town and thousands of villages means—
SALES WITHOUT END.

Excelsior Shades are made in 6 popular colours:

RED, ROSE, GOLD, FLAME, GREEN, BLUE

MADE FOR GAS AND ELECTRIC IN BOTH ROUND AND HEXAGON SHAPE.

SEND FOR COLOURED BOOKLET.

REAL JAP SILK.

PEARL BEAD TRIMMED.

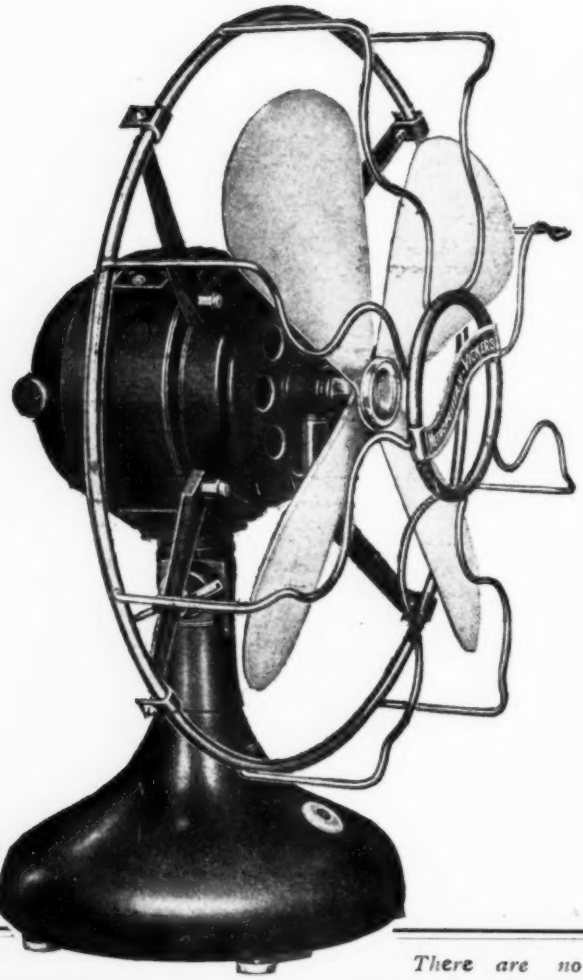
THE EXCELSIOR SHADE MFG. CO.

BETTERWAY HOUSE, 1, JULIAN ROAD, WEST BRIDGFORD, NOTTINGHAM. (Dept. "A.")

COSMOS FANS FOR 1925

Expectations being realized

Resellers of "Cosmos" Fans have been having a busy time during the past few weeks, and we are glad that the hope, expressed by us in our recent advertisement in this journal, has already been realized in considerable measure.



The hot weather will continue or re-occur. To reap the full advantage keep up your stocks of

COSMOS FANS

You have a copy of our combined Text Book and Price List, of course. If by any chance you have not—send for a copy—also a specimen of our attractive "give away" leaflet for overprinting with your own name and address.

METRO-VICK SUPPLIES, LTD.,

(Proprietors: Metropolitan-Vickers Elec. Co., Ltd.)

4, Central Buildings, Westminster, London, S.W.1

BIRMINGHAM LEEDS NEWCASTLE-ON-TYNE
BRISTOL LIVERPOOL SHEFFIELD
CARDIFF LONDON SOUTHAMPTON
EDINBURGH GLASGOW MANCHESTER SWANSEA

There are no Fans better than "Cosmos" Fans. S Ell.

These are the selling points

The sales for Sterling "Primax" Interphones are steady and consistent. These instruments are an absolute necessity in all properly equipped business houses, factories, hotels, public institutions, etc., and inseparable from their efficient running. But their obvious advantages must be constantly brought to the attention of prospective customers. Do that and they soon buy. These are the selling points:—

1. The Sterling "Primax" Interphone System is reliable, efficient and inexpensive. That is proved by the experience of innumerable users everywhere.
2. Induced cross talk is reduced to a minimum.
3. A call can be made in one simple movement.
4. There is no inconvenience of local batteries.
5. The instruments are superbly finished, compact in design and embody more than twenty-five years' experience in the manufacture of telephones.

Immediate delivery is available for prompt orders, and supplies of overprinted literature, offered free of charge, provide valuable help in obtaining sales.

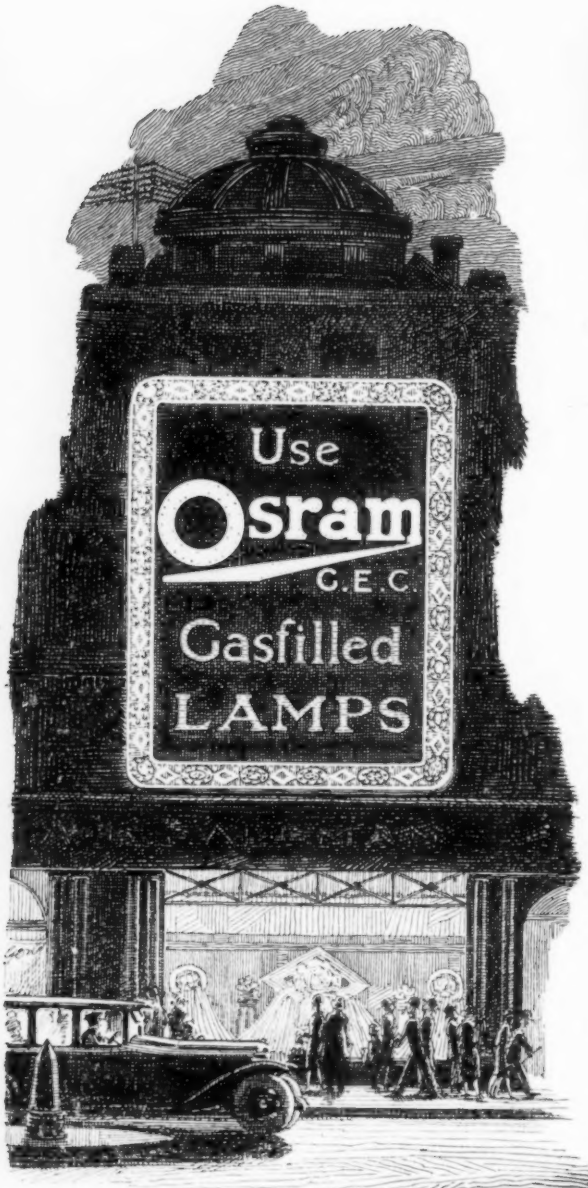
STERLING

PRIMAX

Interphones

Announcement of STERLING TELEPHONE AND ELECTRIC CO., LTD.,
Manufacturers of Telephones & Radio Apparatus, etc. Telephone House, 210-212, Tottenham Court Rd., London, W.1
Telephone: Museum 4144 (7 lines). Telegrams: "Cucumis, Wesdo, London."
Birmingham: 150, Edmund Street. Dublin: 53-54, Lower O'Connell Street. Belfast: Gibson's Buildings, Castle Street. Glasgow: 47, Hope Street. Manchester: 14, St. Peter's Square. Newcastle-on-Tyne: 21, Mosley Street. Cardiff: 10, Park Place. Works: DAGENHAM, ESSEX.

Osram
"MORE LIGHT" RECOMMENDATIONS
Electric Signs



Osram G.E.C

SIGN-TYPE LAMPS
for Electric Signs

The importance which is attached to electric signs as an advertising medium is exemplified by the large number in use.

It is one of the mediums used for advertising OSRAM Lamps. It is a lighting field which dealers might well look to for increasing their installation work and sales of OSRAM Lamps.

Absolute reliability is demanded of all lamps used for electric signs. Dealers who recommend OSRAMS are backed by the service the lamps are rendering to many of the largest electric sign contractors and advertisers in the country.

STANDARD COLOURS, OSRAM Colour-sprayed Lamps—Red, Orange, Yellow, Green, Blue and Flame. Also the White Sprayed.

Advt. of The General Electric Co., Ltd., Magnet House, Kingsway, London, W.C 2.

DISPLAYED ADVERTISEMENTS

As advertised in the "Review," copy and blocks should reach us not later than Thursday morning of the week previous to issue. It has not been our custom in the past to adhere rigidly to this time. In consequence, however, of altered conditions in the Printing Trade and of the growth of the Journal, in order to maintain punctuality of publication it is

ABSOLUTELY ESSENTIAL

that these should reach us to time.

THURSDAY MORNING, PLEASE

AUCTIONEERS

and VALUERS of

Electrical Works, Plant and Stock.

WHEATLEY KIRK, PRICE & CO.

(Established 1850).

46, Watling Street, London, E.C.4. — 16, Albert Square, Manchester.

26, Collingwood Street, Newcastle-on-Tyne.

AUCTIONS.

By Order of the Receiver for Debenture Holders, C. J. Pain, Esq., F.C.A.

MESSRS. CUTTING BROS., PARK WORKS, STAMFORD.

HENRY BUTCHER & CO.

Have received instructions to offer for SALE BY TENDER as Going Concern, the old established

ELECTRICAL ENGINEERING WORKS,

Manufacturing ELECTRIC MOTORS, GENERATORS &c. The works are in full operation, with orders in hand and with works and office staff which could be retained. The property is freehold, having a site area of 4 acres and comprising Workshops and Foundry with clear floor space of about 34,500 sq. ft. Offices, yard and land for extension, adjoining the London, Midland and Scottish Railway.

The Workshops, Iron and Brass Foundries, are fully equipped with modern plant and machinery.

Included in the assets are Complete Working Drawings and Patterns for Motors and Generators up to 100 kW, Polishing Lathes, &c.

Stock, Stores, Furniture and all equipment, together with the GOODWILL of the BUSINESS.

The works may be inspected between the hours of 10 a.m. and 4 p.m. from Monday, June 29th, to Friday, July 3rd, inclusive.

Tender forms and full particulars can be obtained from:—Messrs. Hubbart, Durose & Pain, Chartered Accountants, 18, Low Pavement, Nottingham, and 46, Holborn Viaduct, London, E.C.1; Messrs. Henry Butcher & Co., Engineering Auctioneers, Valuers and Surveyors, 63 and 64, Chancery Lane, London, W.C.2. 7129

Removed for convenience of Sale. Without Reserve.

BY ORDER OF THE LIQUIDATOR.

83, NEWINGTON CAUSEWAY, S.E.1.

HENRY J. SHAW

is instructed to sell by auction on Tuesday, July 7th, commencing at 1 prompt,

STOCK OF AN ELECTRICAL GOODS FACTOR, including 450 coils 1/22 P. & D. V.I.R. English Cable, 10,000 yards 1/.044 ditto, 4,000 yards 1/.036, 2,000 yards 3/.029, 3,000 yards 7/.029, ditto 7/.044, 7,000 yards 7/.052, 10,000 yards 7/.064, 600 yards 37/.064, 1,500 yards 37/.072, 4,000 yards 23/36 Twin Twisted Maroon Flex, 1,500 yards 70/36 ditto.

Ton of various Gauges D.C.C. Wire, 5 cwt. Enamelled Copper Wire on 2 and 4 oz. reels, 5 cwt. Silk Covered ditto, on 1 lb. reels 20,000 yards Rubber Covered leading-in Cable. Ton of Enamelled Copper Aerial Wire, Ironclad Distribution Boards, Electrical Fittings Silk Shades, Accessories, Tricity Cookers, Accumulators, Cord Grip and Screwed Key Switch, Lampholders, Standard Lamps, Hotplates, several Electric Motors, Red and Black Twisted Flex. Quantity useful Wireless Parts and Accessories, Ironclad Switchgear, Terminals, Main Fuses, and an immense quantity of Electrical Goods and Material.

On view day previous, morning of and during sale. Catalogues upon application. 'Phone: Hop 3862. 2085

SITUATIONS VACANT.

Latest time for receiving, 5 p.m. Tuesday.

If letters are not to be delivered to certain firms or individuals (if known), instructions to that effect should be sent to the Manager of the ELECTRICAL REVIEW, who will do his best to carry out such instructions. Letters of applicants cannot in such cases be returned to them, nor can the names of Advertisers using a number in any way be disclosed.

Original Testimonials should never be sent.

COUNTY BOROUGH OF WEST HARTLEPOOL.

Borough Electrical Engineer.

APPLICATIONS are invited for the position of Borough Electrical Engineer upon forms to be obtained from me which must be delivered duly completed and endorsed "Electrical Engineer," at the Municipal Buildings, West Hartlepool, not later than Friday, the 10th July, 1925.

The salary, which will be in accordance with the National Minimum Scale of Salaries for Chief Electrical Engineers of authorised Electricity Supply Undertakings, amounts to £1,015 for the current year.

The person appointed will be required to devote the whole of his time to the duties of the position.

Canvassing will disqualify.

HAROLD W. STANTON,
Town Clerk.

Municipal Buildings,
West Hartlepool,
June 17th, 1925. 2064

STRATFORD-ON-AVON ELECTRICITY CO., LTD.

WANTED by the above, Engine Room Attendant to take charge of a shift, with a knowledge of gas and crude oil engines desirable.

Full particulars and list of duties can be obtained from the undersigned.

Applications, accompanied by a statement of qualifications, should be forwarded to the Company.

W. RENDELL-BAKER,
Managing Director and Secretary.

Registered Office,
Arden Street, Stratford-on-Avon.
June 19th, 1925. 2075

THE MAYBROOK ELECTRICAL CO., LTD.

TRAVELLERS and Representatives required to sell Electric Lamps and Automobile Bulbs in all districts not already covered.

Experienced men knowing the trade and having a live connection only considered.

Salary and commission.

Apply by letter only, with full particulars, to—

THE MAYBROOK ELECTRICAL CO., LTD.,

15 & 16, Whitecross Place, Wilson Street, London, E.C.2. 2101

ELECTRIC LAMP MANUFACTURERS' ASSOCIATION.

LIGHTING Engineers are required to give Lectures and Demonstrations in the Provinces.

Applicants, aged about 30, must have good address, initiative, sound technical and commercial knowledge.

Full details of experience and salary required should be sent to Manager, E.L.M.A., Lighting Service Bureau, 15, Savoy Street, Strand, London, W.C.2. 2088

ELECTRICITY SUPPLY COMMERCIAL ASSOCIATION.

Registered T.U. No. 1708 T.

COMMERCIAL or Clerical Workers who have had any experience in an electricity undertaking and who are requiring employment, are invited to send details of their qualifications and experience to this Association. The object being to record their names for future reference in an employment register. The persons concerned will then receive immediate notification at any time the Association is in a position to recommend a candidate for any appointment.

Particulars should be sent to the undersigned.

G. R. SMITH, General Secretary,
7, Phineas Pett Road,
Eltham, S.E.9.
2129

Cheap prepaid Advertisements are inserted under this heading at the rate of One Penny Per Word (minimum 1s.). Three Consecutive Insertions for the price of two, if ordered and prepaid with first insertion.
Box Number and ELECTRICAL REVIEW address count as seven words.

A LONDON Firm of Electrical Wholesalers require a Representative in Lancashire. Must have an established connection and reside in the district. Reply stating age, salary required, and copies of two testimonials.—2083, Electrical Review, 4, Ludgate Hill, London.

SITUATIONS VACANT.—*Continued.*

A TECHNICAL Assistant is required by the Calcutta Electric Supply Corporation, Ltd. Applicants must have had a sound theoretical training and taken a University degree in engineering. They should have all-round experience in practical engineering, both mechanical and electrical, and must be capable of independent investigation of engineering problems, of arriving at conclusions, drawing up clear concise reports, and suggesting improvements. Age not exceeding 35 years. Terms:—Agreement for five years with salary of Rs. 1,125 monthly, rising by annual increments to Rs. 1,500; free quarters or house allowance in lieu thereof, free first-class passage out and back.—Apply with particulars to the Secretary, Calcutta Electric Supply Corpn., Ltd., 3 & 4, Clements Inn, Strand, London, W.C.2. 2110

ACCUMULATOR Engineer required by oldest and largest Accumulator Company for Sales Department. Only experienced men with live connections among contractors and station engineers will be considered. Liberal salary. Applications must be accompanied with full particulars of qualifications, age and salary required.—2078, Electrical Review, 4, Ludgate Hill, London.

ARMATURE Winder and Electrical Engineer wanted, capable of taking charge of repair shop; must have had considerable similar experience; able to introduce labour-saving methods.—State age and salary required to 1981, Electrical Review, 4, Ludgate Hill, London.

CHIEF Electrical Engineer required by the Government of Nigeria for the Railway Department, for two tours of 12 to 18 months' service, with possible extension. Salary £720, rising to £920 a year by annual increments of £40. Seniority allowance of £72 a year. Free passages and quarters and liberal leave on full salary. Candidates, 30 to 40 years of age, must have served an apprenticeship with an engineering firm of repute and also have taken an electrical course at Leeds or other recognised University. Must have held a responsible position in an electric power station of not less than 2,000 kW installed capacity, with experience in the laying and maintenance of underground mains on both alternating and direct current system. Must also be capable of designing and superintending the construction of installations for power and lighting.—Apply at once by letter, stating age qualifications and experience, to the Crown Agents for the Colonies, 4, Millbank, Westminster, London, S.W.1, quoting M/13660. 2086

CLERK (Shorthand-Typist).—The Sevenoaks and District Electricity Co. have vacancy for Male Clerk at Oxted Office, experienced in supply and contracting clerical work. Showroom experience an advantage.—Apply by letter to Oxted, Surrey. 2096

COUNTER Salesman. Experienced man with thorough knowledge of wholesale electrical and wireless trade wanted, to take charge of branch. Applications will only be considered from men with excellent references who reside in London. Salary £150 and commission. Give full particulars in first instance.—2007, Electrical Review, 4, Ludgate Hill, London.

DESIGNER, first class, required by firm in Midlands, for a.c. machinery up to 500 h.p. Must be thoroughly experienced in all latest methods of manufacture and capable of designing a competitive line of machines. Only first-class men need apply. State qualifications, experience, age, and salary.—7058, Electrical Review, 4, Ludgate Hill, London.

DRAUGHTSMAN-Designer wanted for switchgear for high tension overhead lines. Must have had experience of similar work. State experience, technical training, age, salary expected. Good opportunity for suitable man. Scotland.—6957, Electrical Review, 4, Ludgate Hill, London.

DRAUGHTSMAN, thoroughly experienced in lift work, required immediately.—Apply, stating age, experience and salary required to Pickerings, Limited.—Globe Elevator Works, Stockton-on-Tees. 2070

ELECTRICIAN (Foreman) wanted to take charge of electrical equipment at large engineering works. Must be all-round man and well able to handle staff engaged in repairing and reconstructing electrical machinery. Apply, stating age, experience, salary required, and what educational certificates held.—2068, Electrical Review, 4, Ludgate Hill, London.

ELECTRICIAN wanted to do all rewinds and repairs of a.c. and d.c. motors without supervision; give references and wages.—7089, Electrical Review, 4, Ludgate Hill, London.

EXPERIENCED Salesman for Scotland to handle lamps, fittings and accessories.—State experience and salary required to 2084, Electrical Review, 4, Ludgate Hill, London.

FIRM manufacturing a new and very effective type of Hand-operated Controller for Cranes, &c. also other switchgear, requires Representatives in all districts. Commission only.—2037, Electrical Review, 4, Ludgate Hill, London.

FIRST-Class Maintenance Electrician to take shift in large factory, London district. Would be held responsible for maintenance of single and 3-phase plant, large and small. Must be capable of undertaking own running repairs and extensions. Only first-class man need apply. Rate £4 16s. per week.—2105, Electrical Review, 4, Ludgate Hill, London.

SITUATIONS VACANT.—*Continued.*

GENTLEMAN with knowledge of electric lighting, wanted to canvas outside districts for orders for lighting and fittings, preferably one possessing small car. State age, experience and wages.—Advance Electrical Co., Opera House Buildings, Tunbridge Wells. 7096

JUNIOR Draughtsman required with knowledge of Mains Department work.—State experience and salary required to North Metropolitan Electric Power Supply Company, 15, Friern Barnet Road, N.11. 2099

MANAGER required by an important Electrical Fittings Manufacturer to control sales and manufacture of domestic and public lighting fixtures. It is essential that the applicant is conversant with modern scientific methods of lighting.—Write, giving full particulars, salary required, &c., to 2077, Electrical Review, 4, Ludgate Hill, London.

MANAGER wanted for works employing 30/50 workpeople in Surrey, making electric irons, &c., and fans. Give fullest details of experience and salary expected. 7.30 a.m. man wanted.—2041, Electrical Review, 4, Ludgate Hill, London.

MANUFACTURERS of high-grade Oil Engines and Electric Lighting Plants require Representatives on commission only for the following districts:—Glasgow, Newcastle, Birmingham, Eastern Counties, Ireland and South Wales. Applicants must have existing connections and be in constant touch with leading contractors, &c.—2076, Electrical Review, 4, Ludgate Hill London.

MANUFACTURERS of Lighting Accessories, Ironclad Gear, &c., require keen capable Publicity Man, for preparation of catalogues, &c., and general press advertising. Good prospects for young man with ideas and thorough knowledge of accessories trade. Applicants will please state particulars of their technical and publicity experience, age, approximate salary required, and when at liberty.—Box No. P256, c/o 19-21, Corporation Street, Birmingham. 7046

PLUMBER-Jointer required for Outer London district. Thoroughly experienced in high tension and low tension jointing and services. Also e.h.t. experience desirable. District rate of wages paid. Permanency to first-class man.—Apply by letter with full particulars, to Mr. A. W. Barham, Borough Electrical Engineer, Electricity Works, Watford. 2028

POWER House Working Foreman wanted for 800 kW traction generating station with horizontal slow speed engines and Lancashire boilers. Wages £4 per week.—Apply, stating age, experience, and earliest date when duties could be commenced, to 2097, Electrical Review, 4, Ludgate Hill London.

REPRESENTATIVE required immediately by leading firm of Association Lamp Manufacturers for South Wales. Association experience essential.—Write fullest particulars, experience, age, salary required, &c., to 2104, Electrical Review, 4, Ludgate Hill, London.

REPRESENTATIVE required. Must be experienced and energetic with extensive connection amongst electrical and wireless factors.—Write, giving full particulars of past experience and salary required, to 2128, Electrical Review, 4, Ludgate Hill, London.

SECRETARY Organiser required for Electrical Trade Association. Knowledge of small appliances essential. Pleasant yet forceful personality coupled with executive ability desirable.—Applications considered confidential should state age, experience, salary required, &c., to 2073, Electrical Review, 4, Ludgate Hill, London.

SENIOR Assistant Engineer required by a London Supply Company; experience of three-wire direct current substations and mains essential.—Write stating age, experience, qualifications and salary required, to "S.N.," c/o Streets, 6, Gracechurch Street, E.C.3. 2109

TESTER required by large firm in North of England. Only those with experience in testing medium sized a.c. and d.c. motors and generators need apply.—Please state age, salary required and technical qualifications, to 2059, Electrical Review, 4, Ludgate Hill, London.

TRAVELLER required by well-known manufacturers of conduit and fittings, for London and District. Knowledge of trade and good connections necessary.—2071, Electrical Review 4, Ludgate Hill, London.

TWO vacancies for two strong Youths wishing to take up electrical work in large mine. Instruction given in all repairs, which are done on works. Good chance to train for mining electrical engineers. Wages to start, 15s. per week. Deposit required. £70 each.—Apply 566, Electrical Review, 4, Ludgate Hill, London.

WANTED by leading Engineering Insurance Company, additional Inspectors, fully qualified in best crane and lift practice. Commencing salary £260 per annum.—Apply with full particulars of experience, age, &c., to 2065, Electrical Review, 4, Ludgate Hill, London.

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A COMPETENT Wireman seeks engagement; any system.—L. B., 58, Dimsdale Road, Fulham, S.W.6. 7039

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26 kW Parsons-B.T.H. Petrol Paraffin, 110 volts. New.

110 volts Motors, Switchboard Panels, a.c., 3-phase, l.t. distribution and other equipments.

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All above complete with Control Gear.

Two 250 h.p. B.T.H., 2 ph., 50 per., 440 volts, 418 r.p.m.
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Cutting	12	900		36
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Electromotor	8½	1050	,,	28
Electromotor	8	720	,,	26
B.T.H.	7½	1140	,,	26
Westinghouse	7½	1300	,,	26
Vickers	6-9	1300	,,	26
Electromotor	5½	1350	,,	22
Crompton	5	1250	,,	22
Westinghouse	5	1250	,,	22
Cutting	5	900	,,	23
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One	70	460	"	Westinghouse
One	95	385	"	Bruce Peebles
One	120	465	"	Eng. Elec.
One	120	465	"	L. D. & M.
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Two	12	760	Sq. C.	"
Six	50	580	"	B.T.H.

THREE-PHASE, 40 PERIODS, 2,750 VOLTS.

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One	30	720	"	Parkinson
Two	50	955	"	Newton

THREE-PHASE, 50 PERIODS, 400/440 VOLTS.

Stock.	H.P.	Speed.	Winding.	Maker.
Three	½	1440	S.R.	E.C.C.
One	20	1400	"	Firth & Russell
Two	35	730	"	Siemens
Ten	40	710	"	Westinghouse
Four	40	730	"	Siemens
One	45	950	"	B.T.H.
Ten	45	940	"	Fuller
Three	50	730	"	Siemens
One	50	580	"	E.C.C.
One	80	575	"	Westinghouse
One	130	580	"	L. D. & M.
One	150	366	"	E.C.C.
Three	200	750	"	Newton Bros.
One	330	575	"	Westinghouse
One	3	2800	Sq. C.	"
One	4	720	"	Fuller
One	5	1400	"	Westinghouse
One	15	1440	"	Newton Bros.
One	15	940	"	Westinghouse
One	24	1135	"	Phœnix
One	24	1435	"	Dick Kerr
Five	50	960	"	Newton
Three	60	960	"	"
Six	60	725	"	B.T.H.
Three	60	720	"	L. D. & M.
Five	75	970	"	Newton

THREE-PHASE, 50 PERIODS, 500/550 VOLTS.

Stock.	H.P.	Speed.	Winding.	Maker.
One	37	725	S.R.	Siemens
Ten	42	710	"	Westinghouse
Three	42	710	"	Siemens
Eight	50	940	"	Fuller
One	50	960	"	B.T.H.
One	85	575	"	Westinghouse
One	120	485	"	Bruce Peebles
One	140	580	"	L. D. & M.
One	150	580	"	Eng. Elec.
One	375	575	"	Westinghouse
One	5	1400	Sq. C.	"
One	15	940	"	"
Five	60	725	"	B.T.H.
Three	60	720	"	L. D. & M.

THREE-PHASE, 50 PERIODS, 3,000/3,300 VOLTS.

Stock.	H.P.	Speed.	Winding.	Maker.
One	100	720	S.R.	Westinghouse

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All Machines Guaranteed.

ONLY best makes. Nearly all new, thoroughly overhauled and tested before despatch.

DIRECT CURRENT, 110 VOLTS.

Stock.	H.P.	Speed.	Winding.	Maker.
One	2	410	shunt	Verity
One	3½	250/400	"	L. D. & M.
One	5½	1400	compound	Holmes
One	5½	600	shunt	Newtons
One	6	765	"	Crompton
Two	6	400/1000	compound	E.C.C.
One	7	630	shunt	Newton
Three	10	425	"	E.C.C.
One	10	415	"	Electromotors
One	10	250	"	Brush
One	11	490	"	Verity
One	12½	375	"	Phœnix
One	18	300	"	"
One	19	375	"	Laurence, Scott
Two	20	850	"	E.C.C.
One	21	385	"	Phœnix
Three	24	900	compound	E.C.C.
One	32	275	shunt	Laurence, Scott
One	32½	225	"	"
One	40	375/625	compound	Mawdsley
One	62	450	shunt	Siemens
One	75	840	"	E.C.C.

DIRECT CURRENT, 220/230 VOLTS.

Stock.	H.P.	Speed.	Winding.	Maker.
One	4	820	shunt	Verity
One	5	425	"	E.C.C.
One	7	500/800	"	L. D. & M.
One	10	500	"	Clayton
One	11	1200	"	Newtons
One	13	260	"	Macfarlane
One	14	1260	"	Newtons
Two	15	325	"	Newton Bros.
Two	18½	400	compound	Royce
One	19	215/390	shunt	Electromotors
Three	20	850	"	E.C.C.
One	20	850	"	Electromotors
One	20	500	"	Brush
One	20	800	"	E.C.C.
One	22	975	"	Verity
One	25	750	"	Phœnix
One	37	420	"	E.C.C.
One	38½	750	"	Laurence, Scott
One	42	765	"	Phœnix
One	47	575	"	L. D. & M.
Two	48	270	"	Phœnix
One	50	800	"	Vickers
One	65	550	"	Laurence Scott
One	65	450	"	"
One	80	750/1250	compound	Mawdsley
One	80	590	shunt	Phœnix
One	80	375	"	Brush
One	128	900	"	Siemens

DIRECT CURRENT, 440/500 VOLTS.

Stock.	H.P.	Speed.	Winding	Maker.
Two	10	850	shunt	E.C.C.
One	15	850	"	Stevens & B.
One	16	1650/1720	"	British Elec. Plant
One	26	525	"	Macfarlane
One	30	310	"	Armstrong-Whitworth
Two	37	810	"	Royce
One	38	430/780	"	Electromotors
One	40	600	compound	E.C.C.
Two	40	860	shunt	Royce
One	40	450/780	"	Electromotors
Two	50	585	series	J. P. Hall
Two	55	650	"	"
One	75	840	shunt	E.C.C.
One	160	750	"	Brush

FORTY BROOKHIRST FLOOR MOUNTING D.C. CONTROL PILLARS, FROM 3 H.P. TO 60 H.P.

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'Phone: 4976, 4977, Central, Sheffield.
'Grams: "Topical." Sheffield.
Works: Bamford, Derbyshire, L.M.S. Railway.

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Telephone: City 8620, Manchester.

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400/500 volts, 1 to 220 b.h.p.
200/250 volts, ½ to 70 b.h.p.
100/110 volts, 2, 5, 6, 15, 25 and 40 b.h.p.

D.C. GENERATORS.

250 amps., 210 volts, 675 r.p.m., Royce.
241 amps., 220 volts, 720 r.p.m., Siemens.
152 amps. 230 volts, 885 r.p.m., G.E.C.
49 amps., 225 volts, 1,100 r.p.m., Mawdsley.

A.C. MOTORS.

440/440 volts, 3-phase, 50 cycles, 3 to 100 b.h.p.
400/440 volts, 3-phase, 25 cycles, 2½ b.h.p., 720 r.p.m., slip ring, by Mather & Platt.
220 volts, 3-phase, 50 cycles, 12 b.h.p., 480 r.p.m., Cascade by Sandycroft.

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40 kW, by Phœnix, 3,000/3,300 volts, 3-phase, 50 cycles, 750 r.p.m., with coupled exciter.

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400/500 volts, 3-phase, 50 periods: 2, 2½, 3, 4, 5, 6, 7, 10, 10 (tot. encl.), 15, 30, 40, 60 (with reduction gear), 80, 250 h.p.
3,300/300 Volts.—500 h.p., 291 revs., B.T.H.
Fans.—42 in., 400/440 V, 3-ph., 50 per.: 36 in., 220 V, d.c. All by Keith Blackman.
Dynamos.—220 volts: 35, 40 (200 revs.), 47.5, 60 kW.
Alternators: 220 volts, 3-phase, 50 periods, 35 kVA.
Transformers: Westinghouse Welding Equipment, 10½ kVA, 400/440 volt. British Electric, 40 kVA, 400/230 V; Westinghouse, 10 kVA, 480/220 V; 10 kVA and 2½ kVA, all 3-ph., 50 per., oil immersed.

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OFFERS are invited for the whole or any portion of the Steam Plant in the above station, consisting of four Galloway Boilers, each 26 ft. by 6 ft. 6 in., with feed pump and injector.

Four Cross-Compound Horizontal Steam Engines, by Mather and Platt, speed 150 r.p.m., 120 i.h.p., 120 lb. per sq. inch S.P. driving through linked leather belts.

Four 500/550-volt shunt wound, 60-kW bi-polar Generators by Mather & Platt.

The engines and generators will, if desired, be sold separately.

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EACH comprising a 100-h.p. "Aster" petrol-paraffin engine, direct-coupled to a Siemens Generator, with cooling tanks and high-grade, three-panel switchboard. Brand new. In stock, any voltage, 80/550, and in d.c. and a.c., 3-phase, 50 period types, at less than half manufacturers' price. Inspection Spalding.—Farrow & Sons, Ltd., Spalding. 1562

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3½ h.p. B.T.H. Motor, 1 400 r.p.m., 480 volts, 6/7 amps., compound, totally enclosed, direct current.

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10,000 yd. 4 m/m. Ignition Cable, 98s. per 1,000 yd.
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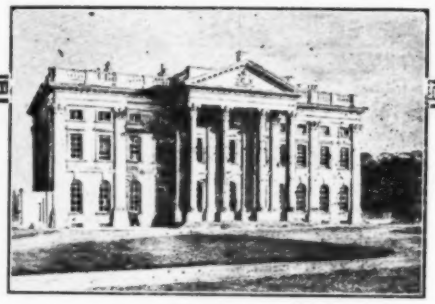
25, 50 and 100 kW, 110 volt, d.c., Allen.
HARRY H. GARDAM & CO., LTD., Staines. 2121

(*Continued on page 34*)



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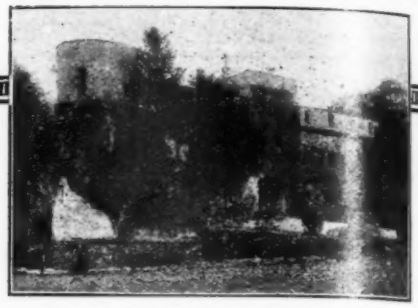
Contractor: J. W. RUSSELL, 8, Queen's Road, Watford.



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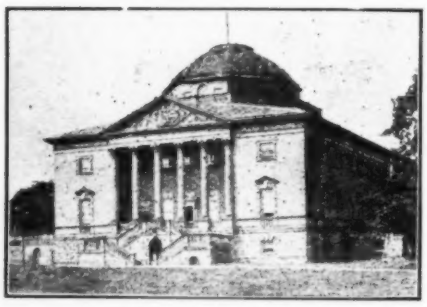
Contractors: G. ANDREWS & CO., 16, Cumberlate, Peterborough.



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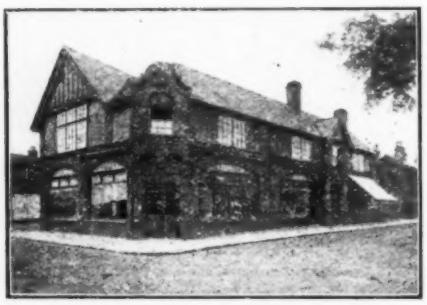

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Contractors: W. T. FURSE & CO., Ltd., Traffic Street, Nottingham.

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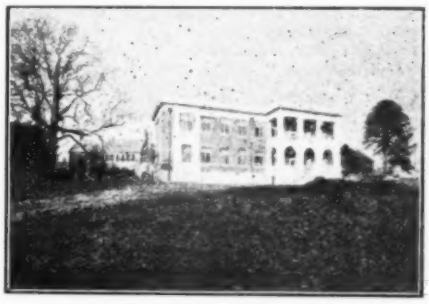
Contractor: J. M. VAUGHAN, 8 & 9, Triangle South, Bristol.



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FOR SALE.—*Continued.*

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DULL Emitter Valves, 3/3½ volts, 0.06 amp., and Bright Emitter Valves, at very low prices.—The Radiolamp Works, Ltd., 6, Korte Schijfstraat, Tilburg, Holland. 1909

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ELECTRIC Signs of every kind. Write for prices.—King Signs, Ltd., 23, Collingwood Street, S.E.1. 6759

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FOR Sale, Meters, continuous current. A quantity of 10 amp., 100 and 200 unit Reason, 3 and 5 amp. O.K., and 3 amp. Ferranti. Adjusted for 208 volts. All in good condition.—1191, Electrical Review, 4, Ludgate Hill, London.

FOR Sale, two De Laval Turbine Generating Sets by Greenwood & Batley, 200 kW, 440 volts, for 70 lb. steam pressure, with condensers, motor driven extraction pumps, and all necessary fittings. Also one nearly new 16 h.p., B.T.H. Motor, 400 volts, 33 amps., totally enclosed, complete with D.P. switch and fuses.—Watts, Hardy & Co. (1920), Limited, Clarendon House, Newcastle-on-Tyne. 1952

FOR Sale, 175 kW Browett/Bruce Peebles Steam Generating Set, 200/220 volts, 428 r.p.m.; also 150 kW Bellis-Siemens ditto, 440/500 volts. Low price, prompt sale.—Williams, 37, Queen Victoria Street, London. 2117

FOR Sale, Telegraph, Transmission, Aerial and Scaffold Poles—marker boards, casing, capping, troughing, clean creosoted or burnettised.—Sir William Burnett & Co., Millwall, E.14. 1033

FOR Sale shortly, Generating Set, comprising 75 h.p. National Gas Engine, type "XE," magneto ignition. 42 kW Dynamo, 110 V, d.c., revs. 800, belt driven. Marble switch panel with meters, main switch and circuit breaker. This set is in good condition and can be seen running at any time by appointment. Offers invited.—The Northampton Theatre Syndicate, Ltd. Northampton. 2067

FOR Sale one Crompton's Generator, 220/226 volts, 500 amps., 170 revs., single bearing, suitable for direct coupling, complete with half coupling.—James Clow & Co., Ltd., Importers & Millers, Princes Dock Mills, Belfast. 2074

FOUR almost new 1½ h.p., squirrel cage Motors, by Westinghouse, 3-phase, 50 cycles, 400/440 volts 960 revs., with starter.—Thomas Mitchell & Sons, Ltd., Bolton. 2016

FUSES.—300 amp., handle type, with clips for panel mounting, D. & S. make, 22s. 6d. each. All other sizes from 5 amps. just as cheap.—Burleigh, 45, Hornsey Road, Holloway, N.7. 1471

HIGH Tension Wire, 41/32, 15 m/m. and 12 m/m. diam., for leading-in aerials; stands 12,000 volts. 35s. and 30s. per 100-yd. coil, respectively; 5 m/m. ditto 220-yd. coils at 35s.—Burleigh, 45, Hornsey Road, Holloway, N.7. 1472

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INSULATORS and Cleats; great variety stocked.—Edwardes Bros., 20, Blackfriars Road, London. 7141

JOURNALS of the Institution of Electrical Engineers. All journals from February, 1912, to date for disposal. Unbound but in excellent condition. Small offer only wanted.—7093, Electrical Review, 4, Ludgate Hill, London.

FOR SALE.—*Continued.*

LIGHTNING Arresters, "Westinghouse" 0—1,000 volts, a.c. or d.c., 10s. each, or a.c. only 6s. each.—Edwardes Bros., 20, Blackfriars Road, London. 7140

MOTORS and Dynamos in stock. Condition guaranteed.—Drummond & Co., Middlesbrough. 2098

NEW 6 in. Screw Cutting Lathe, back geared, gap bed; cost over £90. No reasonable offer refused.—Full particulars to A. Tilley 44, Adams Avenue, Northampton. 7100

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NEW 300- and 500-b.h.p. M.A.N. Stationary Diesel Engines with accessories as delivered from makers under Peace Treaty; also Dynamos for same. All spare parts in stock.—Hick-Diesel Oil Engines, Ltd., 70, Queen Street, E.C.4. 361

NEW 12 h.p., squirrel cage Motor, by Mather & Platt, 3-phase, 50 cycles, 440 volts, 960 revs.; pipe ventilated; Ellison oil immersed starter.—Thomas Mitchell & Sons, Ltd., Bolton. 2015

ONE Second-hand House Telephone System complete including 20 table telephones, 30-line floor pattern switchboard in polished walnut case, magneto generator, also fuse board and lightning arrestor, central battery, &c. Manufactured by Peel, Connor & Co. All in first-class condition. May be inspected at Sentinel Wagon Works, Ltd., Shrewsbury. 2103

ONE 4,000-h.p. Turbo, steam 160 lb., 3,000 r.p.m., with condenser and air pump, suitable for electrical generation.—12 Electrical Review, 4, Ludgate Hill, London.

OVERHEAD Cranes.—One 25-ton Electric Crane, by Carrick and Ritchie, 250 volts, d.c., 46 ft. 6 in. span, and one 5-ton hand Crane for 20 ft. engine room, by same maker.—Harry H. Gardam & Co., Limited, Staines. 2031

PETROL-Paraffin Electric Generating Sets, 2 to 25 kW, by Aster, Austin and Gardner. Immediate delivery.—Harry H. Gardam & Co., Limited, Staines. 2120

SCIENCE Abstracts, Sections A and B, complete; Vols. 1-15 bound, 16-25 unbound. ELECTRICAL REVIEW, 1897 to end of 1914 bound, remainder unbound to date. *Journal* of the Institution of Electrical Engineers, Vols. XXIII to LI bound, remainder unbound to recent date.—6742, Electrical Review, 4, Ludgate Hill, London.

SILICON Bronze Aerial Wire, as used by Admiralty; 3/18 S.W.G.; better reception than copper, does not corrode. One-mile drums at 70s.—Burleigh, 45, Hornsey Road, Holloway, N.7. 1473

SURPLUS Stock of /5 amp. 2 pin Wall Plugs, 8s. 6d. per doz. Batten Holders, 4s. 6d. per doz.; Walnut Adaptors, 4s. 6d. per doz.; Pressel Switches, 1 and 2 way, 12s. 6d. per doz.—Hendon Electric Lamp Co., 104, Southampton Row, W.C.1. 2116

SWITCHBOARDS, fitted volt and ammeters, switches, wattmeters, &c., &c. Hundreds in stock all new, in all sizes, at sacrifice price to clear.—Burleigh, 45, Hornsey Road, Holloway, N.7. 1474

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V.I.R. Cables, C.T.S. ditto, Lead-covered ditto, Wireless Flexes, best makes. Assorted sizes up to 37/14; extra cheap. Write for New Price List just issued.—Edwardes Bros. 20, Blackfriars Road, London. 7135

V.I.R. (C.M.A.) Cable, new, 220 yd. coils 3/18, at 32s. 6d. coil; 1/16 at £1 coil; 3/22 at 15s. coil; 1/18 at 12s. 6d. coil; all other sizes in stock just as cheap.—Burleigh, 45, Hornsey Road Holloway, N.7. 1694

1 H.P. Crypto Motor, starter, 2 switch boxes; 200 ft. wire; 100 ft. tubing; 18 ft. 1½-in. shafting; 3 hangers; 3 oil cans; 3 oil bottles; 6 pulleys; 3 belts; 1 grindstone; 1 drilling machine. Lot £22.—Apply after 6 p.m., 177, Hemingford Road, N.1. 7099

7/16 TWIN Cab tyre Cable, 80 yd. coils, new C.M.A. grade, at £7 per coil; all other sizes in stock.—Burleigh, 45, Hornsey Road, Holloway, N.7. 1476

10 H.P. Siemens d.c. Motors, 220/240 V, 890 revs., new. 10 h.p. ditto, fitted with reduction gears. Also stock of Secondhand Motors and Lighting Sets, cheap.—Edwardes Bros., 20, Blackfriars Road, London. 7137

19/14 V.I.R., two 55-yard lengths, as new, £6. Richmond Vacuum Cleaner, £5. ¼ h.p. Horizontal Gas Engine, two flywheels, £4. 12 miles 1/22 twin armoured Telephone Cable, £2 per mile.—White, 222, Barcombe Avenue, S.W.2. 'Phone: Streatham 4769. 7133

FOR SALE.—*Continued.*

35-KW, d.c. Generator, by Westinghouse, 220/250 volts, 1,000 revs., 4 poles and interpoles; with switchboard. In stock.—Thomas Mitchell & Sons, Ltd., Bolton. 2017

60 H.P., 400/440 volts, 3-phase, 50 periods, 720 revs., slip-ring Motor, Macfarlane, Ellison gear, with David Brown reduction gear.—Greenhalgh Bros., Atherton. 1305

80 H.P., 400/440 volts, 3-phase, 50 periods, 585 revs., Crompton Motor; contactor panel, for push button or automatic starting; unused.—Greenhalgh Bros., Atherton. 1137

80-VOLT, 250-amp., Boothroyd comp. wd. Dynamo, 850 r.p.m., £50. A.c. and d.c. Motors, various sizes, cheap.—Cole, 457, Rathgar Road, Loughborough Junction, S.W.9. 7090

82 KW, 220-volt, Westinghouse interpole Dynamo, two end shield bearings, 800 r.p.m.—Britannia Mfg. Co., Ltd., 22-23, Britannia Street, City Road, N.1. 2112

250-H.P., 400/440 V. 3-ph., 50 per., 416 revs., B.T.-H. Motors; 4 available.—Greenhalgh Bros., Atherton. 32

550 B.H.P. Triple Expansion Enclosed H.S. Steam Engine, by Belliss; also 430 h.p. ditto, 160 lb. w.p.—Harry H. Gardam & Co., Limited, Staines. 2094

75,000 "RING" make Lamps, gasfilled, half-watt type, metal and carbon filaments; extra cheap to clear.—Edwardes Bros., 20, Blackfriars Road, London. 7134

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ACCUMULATOR Scrap, £18 per ton, cash. Cable, old, electric, unarmoured, 25s. per cwt. Lighting Set, d.c., for house, cheap. Dynamos old, for experimental purposes.—The Stores, 341, Leeds Road, Bradford. 7097

BATTERIES (Storage), old Dynamos, Transformers, Arc Lamps, Electric Meters, Scrap Cable, Metals or Machinery of any description purchased. Distance no object.—A. Learoyd & Son, Bridge Works, Heatherley Street, Clapton London. Telephone: Clissold 2278. Tele. address: "Frangible, Lowclap, London." Established 1860. 7004

FEW (secondhand) 3-phase, 400 volt, 25 period Motors, from 2 h.p. to 10 h.p.; also single-phase Motors for above supply from ¼ h.p. to 1½ h.p.—2081, Electrical Review, 4, Ludgate Hill, London.

PLATINUM Scrap purchased in large or small quantities. Highest market price paid. A trial solicited before selling elsewhere.—The old advertiser, L. Stern, 5, Bold Street, Liverpool. Established 25 years. Parcels by post, prompt cash or cheque per return. 1612

V.I.R. Cable wanted, 280 yards, 19/.064, 600 yards 7/.052, 150 yards 7/.064, 30 yards 37/.083.—7114, Electrical Review, 4, Ludgate Hill, London.

WANTED, 50/75 kW Alternator, direct coupled to high speed steam engine. Alternator should be wound for 420 volts, 3-phase, 50 periods, and the engine should be suitable for a working pressure of 200 lb. per sq. inch superheated steam.—2127, Electrical Review, 4, Ludgate Hill, London.

WANTED, 130-h.p. Motor, 3,300 volts, 3 phase, 50 cycles.—2107, Electrical Review, 4, Ludgate Hill, London.

¼ H.P. 12 or 24 volt, d.c. Motors; fairly low speeds.—V. M. Tate & Co., 49s, St. Paul Street, Leeds. 7112

500-KW Steam Turbo-driven Alternating Generating Set wanted, 500/550 volts, 3-phase, 50 cycles. To be complete with condenser and pumps and ready for immediate work. State fullest particulars and very lowest cash price for re-sale.—Herbert, Engineer, North Shields. 2126

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DIRECTOR (non-active) required for London Company which would be of particular interest to an engineer. Investment £2,000. Director's fee, £100 p.a., 10 per cent. interest on capital, and share of profits. Open to solicitors' and accountants' investigation.—Write Box 215, at Horncastles, 60, Cheapside, E.C.2. 7104

PARTNER wanted in Midlands for small workshop and installation work; one with knowledge of wireless preferred; large capital not necessary, but must be practical and energetic.—7119, Electrical Review, 4, Ludgate Hill, London.

PARTNER wanted with about £500 in old-established Electrical (and now Wireless) Business. Or would consider amalgamation with another firm to economise expenses.—7116, Electrical Review, 4, Ludgate Hill, London.

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ELECTRICAL and Wireless Engineers. Established four years. Accountant's figures. Excellent showroom, workshop and premises in best position in Richmond; good lease and well-fitted premises. Price, inclusive of plant, fixtures, fittings and tools, £200, plus stock at valuation. Excellent opportunity for thoroughly practical man; partnership entertained.—Box 93, Payne-Jennings, 26, Shaftesbury Avenue, W.1. 2124

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FOR Sale. Electrical Motor Manufacturers are prepared to dispose of Goodwill, Patterns, Drawings, and good stock of all materials.—For further particulars apply 2012, Electrical Review, 4, Ludgate Hill, London.

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£3,000 Wholesale and Retail Electrical and Wireless Business for disposal, together with leasehold premises in West Central District of London.—7122, Electrical Review, 4, Ludgate Hill, London.

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AGENTS wanted in Yorkshire, Midlands and South Wales, by well-known firm of electric motor manufacturers.—Full particulars, stating connections and terms, to 2089, Electrical Review, 4, Ludgate Hill, London.

AGENTS wanted in South Wales with Cardiff office, also West of England and Eastern Counties, for our single, 2- and 3-phase and d.c. Motors.—Wright Motors, Ltd., Halifax. 2079

ELECTRIC Vacuum Cleaners. Agents wanted to sell high-grade machine for cash or easy payments. Excellent proposition for those willing to demonstrate and actively push sales.—Apply Superlamp, Ltd., 92-94, Paul Street, London, E.C.2. 1931

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SOUTH Africa. Sales Engineer desires additional Agencies. —7098, Electrical Review, 4, Ludgate Hill, London.

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SECOND-Hand Plant examined for purchase.—British Engine, Boiler & Electrical Insurance Co., Ltd. See p. liii.

WANTED, full details and prices of all plant and materials required for the manufacture of electric lamps and radio valves.—7144, Electrical Review, 4, Ludgate Hill, London.

Where Advertisements are to be answered to a given number at the ELECTRICAL REVIEW Office Applications for Names and Addresses of the Advertisers will be entirely disregarded, and Letters giving incorrect Box Numbers will be destroyed.

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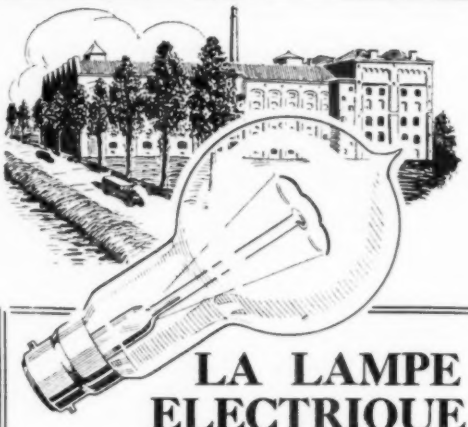
By **T. F. PURVES,**

Engineer-in-Chief's Department, G.P.O.

Cloth, **3s.** net. Post Free, **3s. 4d.**

Contents:—Section 1.—Early Switching Systems. Section 2.—Belgian System of Intercommunication Switching. Section 3.—Post Office "Concentrator" System. Sections 4 and 5.—London Intercommunication Switching System; Mechanical and Electrical Details.

The ELECTRICAL REVIEW, Ltd., 4 Ludgate Hill, E.C.4



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SOCIÉTÉ ANONYME LESSINES, BELGIUM.

WHEN we tell you that our lamps are selling on their own merits without advertisement, you may wonder why this adverisement appears.

The reason is sound business.

It has been brought home to us that the market for our lamps is far bigger than we expected and markets exist to be exploited.

Our lamps owe their reliability and competitive price to the fact that we possess the most up-to-date machinery in a highly organised factory with a staff of engineers who are specialists in Metal Filament and Half Watt type Lamps.

We shall esteem enquiries from IMPORTERS and large wholesale distributors.

THERE IS NO BETTER THAN THE BEST.

Sole Agent for the United Kingdom:

A. SINNATT, 7, Great St. Helens, LONDON, E.C.3.

Telephone: Avenue 2499.

AN INVITATION.

Large Buyers are invited to send their enquiries to us for Special Low Prices of

PRESSPAHN — EBONITE SHEETS
ADHESIVE TAPE — INSULATING TISSUE
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PURE RUBBER TAPES
Lebakite Sheets, Tubes and Paper,
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RELIABLE QUALITIES.

Dont miss this opportunity to reduce your manufacturing costs.

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INSULATION DEPT.,

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SAFE-ECONOMY ELECTRIC IRON.

WILL NOT BURN ITS WAY THROUGH YOUR TABLE IF FORGOTTEN.

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GRIP CONTROL SWITCHES FOR ELECTRIC DRILLS, etc.

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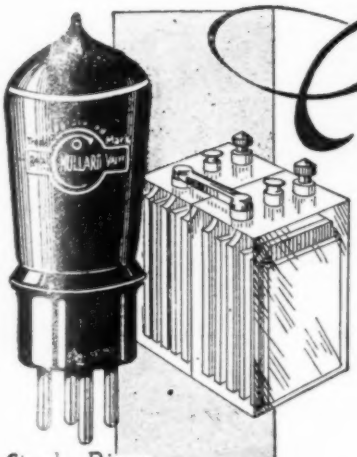
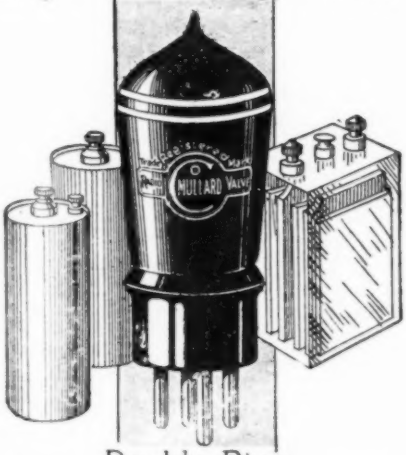
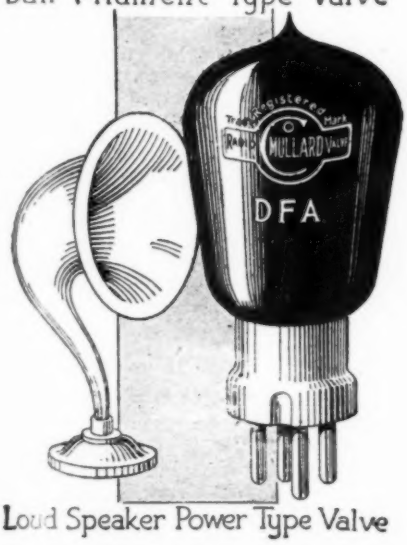
Comprehensive Range



Single Ring
Bright Filament Type Valve



Double Ring
Dull Filament Type Valve



Loud Speaker Power Type Valve

A Valve for Every Customer

Here are Master Valves for perfect long distance and pure tone reception. You will find in these three groups a range of Master Valves that will produce the finest wireless reception from your customers' sets. Make your own choice and note the increase in your sales.

BRIGHT FILAMENT VALVES.

FOR 4-VOLT ACCUMULATORS.

Mullard H.F. Red Ring Valves for H.F. AMPLIFICATION **8s.** each
Mullard L.F. Green Ring Valves for L.F. AMPLIFICATION **8s.** each
(Recommended for reflex and dual circuits.)

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Mullard H.F. Double Red Ring Valves for H.F. AMPLIFICATION.

Type D '3, for Accumulators (1'8-2 volts) ... ... **14s. 0d.** each
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Type D '3 for Accumulators (1'6-2 volts) ... ... **14s. 0d.** each
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Type D '3 for Accumulators (1'8-2 volts) ... ... **14s. 0d.** each
Type D '06, for Dry Cells (2'5-3 volts) ... ... **16s. 6d.** each

NOTE.—Mullard Double Green Ring Valves will operate small and medium-sized loud speakers.

LOUD SPEAKER VALVES.

Mullard D.F.A. 0 ('35 amp.), for 4-volt Accumulators **22s. 6d.** each
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Leaflet V.R. 25 gives full information.

Write for Trade Terms and details of the Mullard Service to all Retailers.

Mullard

THE·MASTER·VALVE

Advt.—The Mullard Radio Valve Co., Ltd. (E.R.), Nightingale Works, Balham, S.W.12.

SLYDLOK FUSES

STANDARD TYPE
Ordinary finish.

For general use as main, sub-service or section fuse, &c. Adaptable for both or either front and/or back connecting by cables, studs or to bus-bar and needs no further protection or earthing.

10/15 amps. at 500/250 volts. Size overall 3⅜" × 1⅜" × 1". Five fuses. Weight one pound.

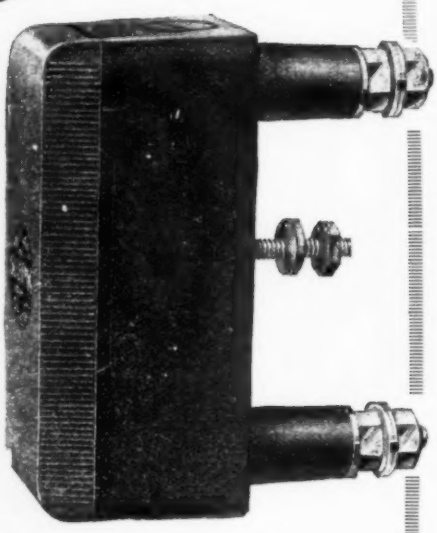
PRICE: 3/- *each*, 35/- *per doz. Subject.* Without sealing pin.

PANEL TYPE
Polished

Ideally adapted for mounting direct upon metallic and similar panels such as cookers, controllers, truck type switchgear, &c.

Capacity as above.
Size 2¾" × 2" × 1".
Weight 4 ozs.

PRICE: 3/4 *each*, 38/- *per doz. Subject.* Less studs.



SWITCHBOARD TYPE
Polished finish.

An extremely neat and compact unit for general switchboard work, traction, lighting circuits, lighting sets, portable equipment, marine installations, confined spaces or restricted weight, &c.

10/15 amps. at 500/250 volts. Size overall 2¾" × 1¼" × 1". Weight 3 ozs., without studs.

PRICE: 3/2 *each*, 36/- *per doz. Subject.* Connecting studs extra.

Any type can be supplied fitted with knurled, solid flush or open flush end bushes or plugs, or with plain faced covers or covers embossed with any trade mark or name. For interior details of SLYDLOK Self-aligning, Interlocking, Vibration-proof, Machine-faced, Longitudinally sliding Plug fitting contacts get this introductory price folder 1—

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Government G S R Surplus

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WEEKLY BULLETIN

Delivery from stock

4 200-KW. CROMPTON D.C. GENERATORS.
220/410 volts.

3 102-KW., D.C. Do. By ELECTROMOTORS.
230 volts.

1,000 K.V.A. Transformers.

A COMPLETE GENERATING STATION. 3,300 v., 3-ph. 50 p.

SEND FOR QUOTATIONS.

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The Electric Tramcar Hand-book.

For Motormen, Inspectors and Depot Workers.

By W. A AGNEW.

3s. 6d. Post free, **3s. 8d.**

THE ELECTRICAL REVIEW, Ltd., 4, Ludgate Hill, E.C.4.

OFFICIAL NOTICES.

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CITY AND ROYAL BURGH OF DUNDEE.

Electricity Department.

THE Corporation invites tenders for the supply, delivery and erection of Main Steam and Exhaust Pipes, in connection with one 12,500 kW Turbo Alternator Set, also Hoswell tank, feed pump and piping.

Specification, drawings, form of tender and general conditions of contract may be obtained from the undersigned on payment of one guinea, which will be returned on receipt of a *bona-fide* tender.

Tenders (sealed in envelopes provided) to be lodged with the Town Clerk, City Chambers, Dundee, not later than by first post on Friday, July 17th, 1925.

The Town Council do not bind themselves to accept the lowest or any tender.

D. H. BISHOP, B.Sc., M.I.E.E.,
General Manager and Engineer

Electricity Supply Department,
Dudhope Crescent Road, Dundee.
Tuesday, June 23rd, 1925. 2x40

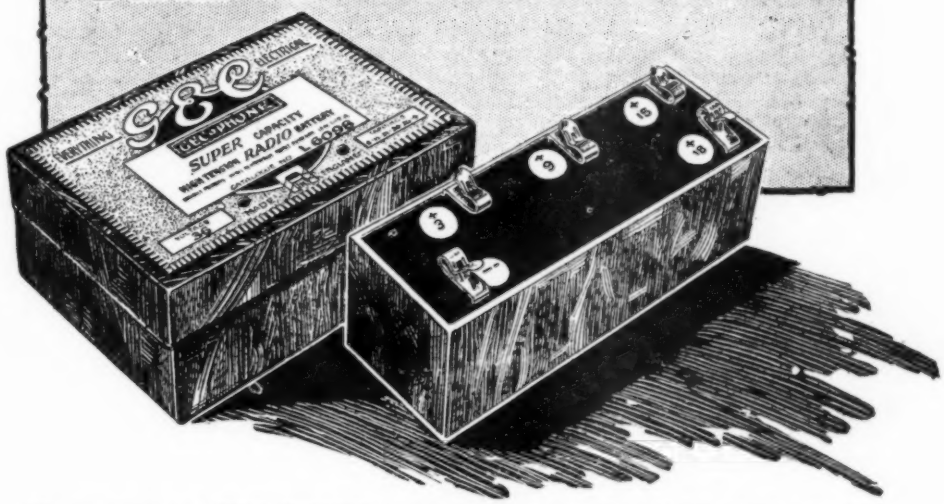
(Continued on page 40.)

A New Line for the Wireless Trade

GECoPHONE

(Registered Trade Mark)

Super Capacity High Tension
RADIO BATTERIES



The new range of GECoPHONE super capacity Radio Batteries will undoubtedly become one of the biggest selling and most profitable lines in the wireless trade.

The widespread desire for improved reception and the ever increasing use of Loud Speakers has created a demand for H.T. Batteries of large capacity and long life, and after much research the G.E.C. has specially designed this range to meet the demand. Some of their outstanding merits are :—

LONG LIFE—four to five times as long as other types composed of small cells;

MINIMUM INTERNAL RESISTANCE;

SILENCE IN USE;

IMPROVED RECEPTION—by virtue of being specially designed for wireless work;

SPRING CLIP TERMINALS.

These Batteries are destined to become the standard H.T. Batteries for wireless. They will be extensively advertised to the Public, and the more their qualities become known the more insistent will be the demand.

TYPE.	Volts.	No. of Cells.	Terminals connected at	Approx. Overall Dimensions.	PRICE. £ s. d.
L. 6097	18	12	0 - 3 - 9 - 15 - 18 (+)	8¼" × 3¼" × 4"	7 6
L. 6098	36	24	0 - 15 - 24 - 30 - 36 (+)	8¼" × 6" × 4"	14 0
L. 6099	72	48	0 - 9 - 15 - 30 - 45 - 72 (+)	8¼" × 11¾" × 4"	1 7 6

PLACE YOUR ORDER NOW FOR IMMEDIATE DELIVERY.

THE GENERAL ELECTRIC CO., LTD.,

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Branches throughout Great Britain and in all the Principal Markets of the World.

OFFICIAL NOTICES.—(*Con. from Sup.* 38.)

PENYBONT RURAL DISTRICT COUNCIL.

Kenfig Hill Electricity Scheme.

TENDERS are invited for the supply, laying and erection of Low-tension Underground and Overhead Mains, Transformers, Switchgear, Meters and House-Wiring. Copies of specification, general conditions and form of tender may be obtained from Mr. W. Welbury, Electricity Works, Bridgend, on payment of deposit of £2 2s., which will be returned on receipt of a *bona-fide* tender.

Extra copies may be obtained on payment of the sum of five shillings each, which amount will not be returned.

Sealed tenders, endorsed "Tenders for Electrical Scheme" are to be delivered to the undersigned not later than July 31st, 1925.

The Council do not bind themselves to accept the lowest or any tender, and the Council's acceptance will be subject to the approval of the Electricity Commissioners.

By Order,
R. HARMAR COX,
Clerk.

Council Offices,
8, Wyndham Street, Bridgend,
June 20th, 1925. 2082

SKIPTON URBAN DISTRICT COUNCIL.

Electricity Department.

TENDERS are invited for the supply and delivery of paper-insulated, lead-covered and double steel tape-armoured low-tension Cable, as under:—

450 yards .06 by .06 by .06 by .03 4-core.
1,500 yards .007 by .007 Twin.

The cable is to be manufactured in accordance with the latest British Engineering Standard Specification, and the price quoted is to include delivery at the Council's Electricity Works.

Tenders, stating price and time required for delivery and endorsed "Cable," to be sent to the undersigned not later than first post on Friday, July 10th, 1925.

The lowest or any tender will not necessarily be accepted.

J. P. HORNE,
Clerk to the Council.

Town Hall, Skipton. 2072

COUNTY BOROUGH OF WEST HAM.

Education Committee.

TO ELECTRICAL WIRING CONTRACTORS.

THE Education Committee invite tenders for the Electrical Wiring of eight schools. The work is to be carried out with the engagement of unemployed labour from the local Employment Exchange in accordance with the conditions laid down by the Unemployment Grants Committee.

Contractors desiring to tender are requested to make written application to Mr. John H. Jacques, Licentiate R.I.B.A., Architect to the Committee, 61, West Ham Lane, Stratford, E.15, for copy of specification, conditions and form of tender not later than Monday, July 6th, 1925. Each application must be accompanied by a deposit of £1, to be returned to those who send a *bona-fide* tender in the manner and at the time stipulated.

Sealed tenders in the envelope supplied must be delivered at the Education Department, 95, The Grove, Stratford, E.15, not later than 6 p.m. on Monday, July 20th, 1925. The Committee will not be bound to accept the lowest or any tender.

The Contractor whose tender is accepted and with whom a contract is entered into will be required to enter into a bond with sureties for the due and satisfactory performance of the contract, and to pay the whole of his workmen such rates of wages and observe such hours of labour as are recognised by the Trades Unions.

In the event of any breach of such agreement, the Council will enforce the penalty clause in its entirety.

GEORGE E. HILLEARY,
Town Clerk.

Education Department,
95, The Grove, Stratford, E.15,
June 22nd, 1925. 2111

TO ELECTRICAL CONTRACTORS.

THE Commissioners of His Majesty's Works, &c., are prepared to receive tenders before 11 a.m. on Thursday, July 9th, 1925, for the supply and erection at the National Physical Laboratory, Teddington, of one 110 volt, 3,500 ampere-hour Secondary Battery.

Drawings, specification, a copy of the conditions and form of contract, forms of tender, &c., may be obtained from the Contracts Branch, H.M. Office of Works, King Charles Street, London, S.W.1, on payment of one guinea. (Cheques payable to the Commissioners of H.M. Works, &c.) The sums so paid will be returned to those persons who send in tenders in conformity with the conditions. 2102

OFFICIAL NOTICES.—*Continued.*

LEWISHAM UNION.

Installation of Electric Clocks.

THE Guardians of the Poor of the above Union invite tenders for an Installation of Electric Clocks at their Hospital, High Street, Lewisham, S.E.13.

The specification and schedule can be seen by arrangement at the Guardians' Offices and copies can be obtained on payment of the sum of one guinea, which will be returned after the receipt of a *bona-fide* tender.

Tenders, on the prescribed form, in sealed envelopes, addressed to me and endorsed "Tender for Electric Clocks," must be delivered at the Guardians' Offices at or before 10 a.m. on Monday, the sixth day of July, 1925.

The Guardians do not undertake to accept the lowest or any tender.

By Order, W. R. OWEN,
Clerk to the Guardians.

Guardians' Offices,
391, High Street,
Lewisham, S.E.13.
June 10th 1925. 2087

NOTICES RELATING TO PATENTS.

Advertisements are inserted under this heading at 1*d*. per inch.

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School of Electrical Engineering.

This Institution—the largest in the world devoted to spare-time training—has complete Courses of Instruction to cover the

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Entrance Exam. for Asst. Eng., G.P.O.

Other Courses meet the requirements of all who desire a thoroughly practical and profitable technical education, and all who wish to qualify for positions in the Design Office, Test Room or Drawing Office, or as Chief Engineers, Assistant Engineers, Shift Engineers, or Switchboard Attendants in Electric Power, Light and Traction Stations. Equally successful is our instruction for Telegraph and Telephone Engineers, Telegraphists and Telephonists.

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UNIVERSITY COLLEGE, SOUTHAMPTON.

EXCELLENT opportunities for training in Electrical Engineering. Students may obtain a University Degree and the Diploma of the College.

The firm of Pirelli-General, whose cable works are in Southampton, co-operates with the College and provides special facilities for students wishing to become Electrical Cable Engineers.

Apply to the Registrar for "Handbook of the Faculty of Engineering," "Engineering Scholarships," and "Calendar." 2092

BINDINGS AND CASES.—Subscribers of the ELECTRICAL REVIEW and others can have their half-yearly numbers bound handsomely in Black Cloth at the rate of 6/6 per Volume, including Index. Cases for binding are also supplied at 4/6 each, post free 5/-. Indices gratis on application.

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102, 103 & 104, Minories, LONDON, E.C.

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Indicating & Recording.

Another example of our up-to-date "Ideal" Series of instruments incorporating in their excellence the manufacturing experience gained during forty years.

Advantages include :—

Long and bold scale.

Accuracy unaffected by variations of temperature or of voltage over wide limits.

Switchboard Instruments are self-contained, external resistances and reactances are dispensed with.

Made also in circular 8 in. dial case.

Can also be supplied in the Recording Type.

The instrument illustrated is the 12 ins. scale, Sector Pattern N.C.S. Deflectional Frequency Meter. This has a long and bold scale, and its accuracy is unaffected by variations of temperature or of voltage over wide limits.

NALDER BROS. & THOMPSON, LTD.,

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Telephone: Clissold 2365 (3 lines). Telegrams: "Occlude, Kinland, London." Codes: Western Union (Universal & Five Letter Ed.) and B.E.A.M.A.

AGENTS :—Berry's Electric, Ltd., 5, Deansgate, Manchester. Berry's Electric, Ltd., Ironclad Works, Spring Road, Hall Green, Birmingham. Wm. McGeoch & Co., Ltd., 28, West Campbell St., Glasgow. Robert Bowran & Co., Ltd., 4, St. Nicholas Bldgs., Newcastle-on-Tyne. Simpson, Baker & Co., 2-5, Nelson St., Bristol. Balmer Lawrie & Co., Calcutta. Greaves, Cotton & Co., 1, Forbes Street, Bombay. Fred. S. Lee, Ltd., 38, Market Street, Sydney, N.S.W. Turnbull & Jones, Ltd., 19-23, Blair Street, Wellington, New Zealand. Ernest Demoly, 43, Rue de Trevise, Paris.

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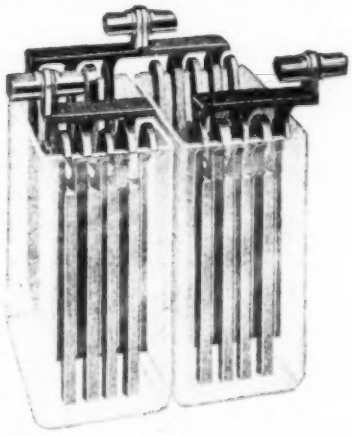
"Q.H." TYPE CELLS will be found particularly suitable for use with all TELEGRAPH TELEPHONE and SIGNALLING SYSTEMS.



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The long hours of daylight, with comparatively little demand on the lighting plant, make summer time ideal for battery overhaul.

Do not wait until the need for overhaul, emphasised by the shortening days, is imminent. Battery makers and contractors are always busy then.

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THE LARGEST BATTERY WORKS IN THE BRITISH EMPIRE.

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these packages, no doubt you have used HELSBY CABLES in the new packing. It was handy, wasn't it. No hessian, no untidiness, you cut off the length you required, and the cable was still neatly stowed. The cartons with the ring are easy to carry. They don't require the hand that you want for your tools. The contents?—Well, the world has yet to better British C.M.A. Cables.

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CABLES and WIRES

are made for nearly every purpose, and they're built practically—from core to packing. Your storekeeper, your wireman, above all—your client will appreciate them. You can't better them.

Use them always.

British Insulated & Helsby Cables, Ltd.

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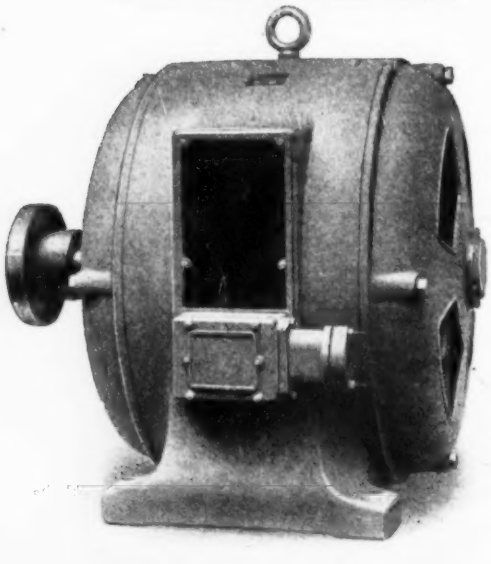

"HIGH STARTING TORQUE MOTORS WITH SQUIRREL CAGE ROTORS."

"SKRN" Motors for crane service give twice full load starting torque with two and a half times full load current.

Simple, Reliable, Thorough Throughout.

F & A. PARKINSON LTD
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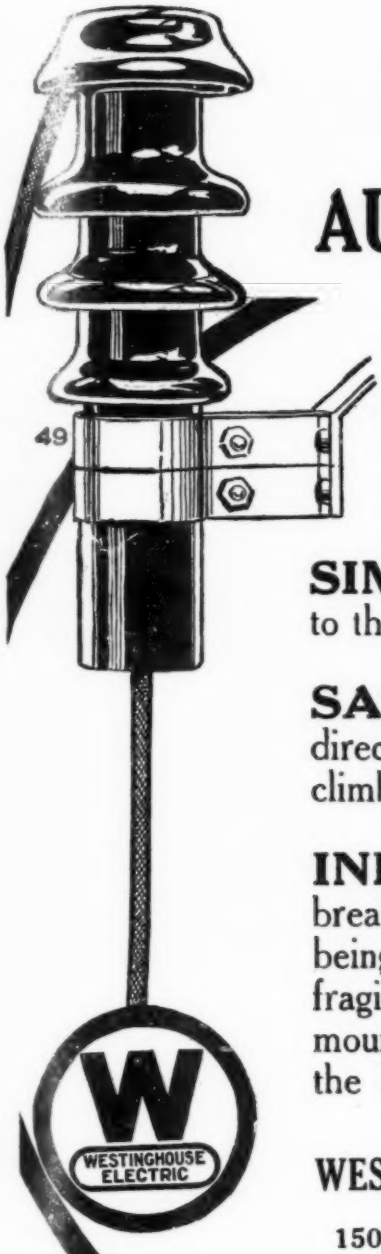
There is a Parkinson type "SKRN" Motor for almost every duty.



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High Protection at Low Cost.

SIMPLE, because the bracket can be attached to the cross-arm with a single bolt or clamp.

SAFE, because the arrester can be mounted directly under the line wire, giving the maximum climbing space and great safety to linemen.

INEXPENSIVE, first, because there is less breakage when installing, the mounting bolt or clamp being attached to the metal bracket and not to fragile porcelain. Second, because all sizes can be mounted from the same cross arm which supports the line insulators.

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An Association of progressive Electrical Factors, the main function of which is to secure the efficient distribution of Electrical Supplies and Equipment.

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represents a definite attempt to place all Electrical trading on a just and equitable basis as between Manufacturer, Wholesaler, and Electrical Contractor or Retailer.

While there may possibly be points of disagreement on details, the Electrical Wholesaler's Federation, as stated in their published Trading Policy, are quite prepared to discuss these with the various sections of the Electrical Industry concerned.

The Secretary will be glad to send a copy of the E.W.F. Trading Policy to anyone interested.

THE ELECTRICAL WHOLESALER'S FEDERATION, LTD.,
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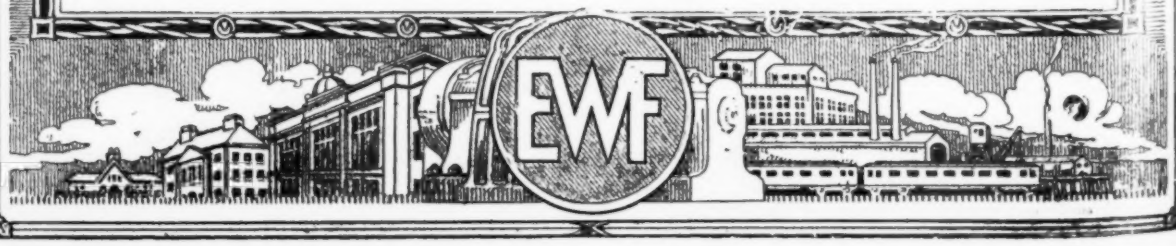

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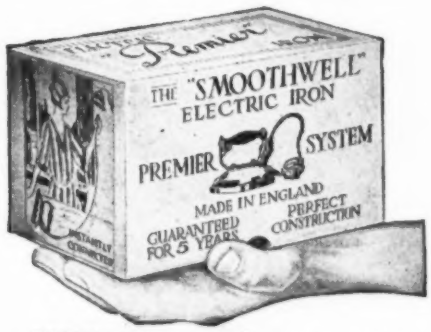

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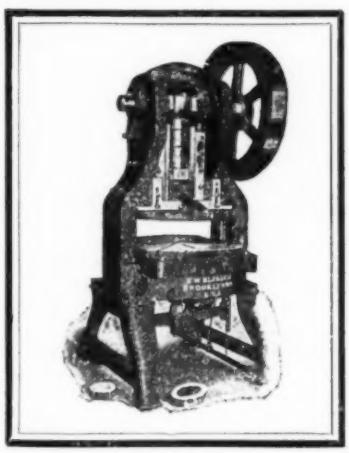

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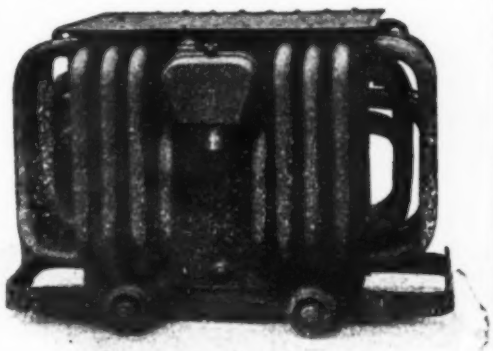

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TRANSFORMERS of all types, voltages and capacities, built to the B.E.S.A. specification or for Transformers to meet your special requirements—our experience and resources are at your disposal

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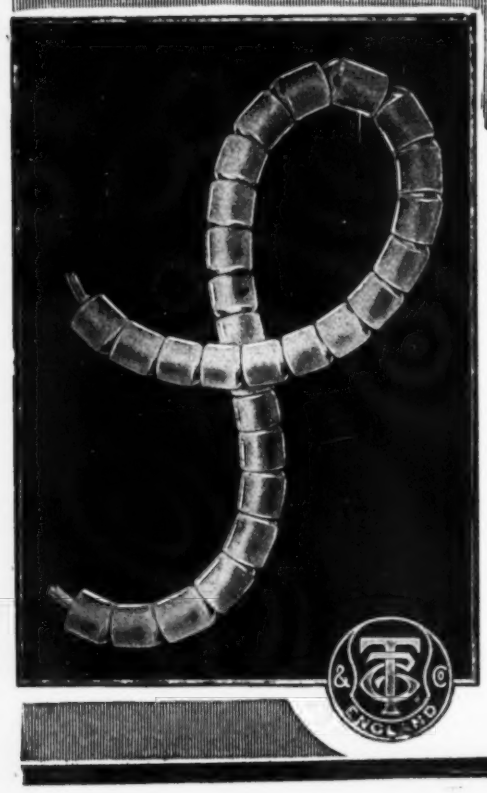

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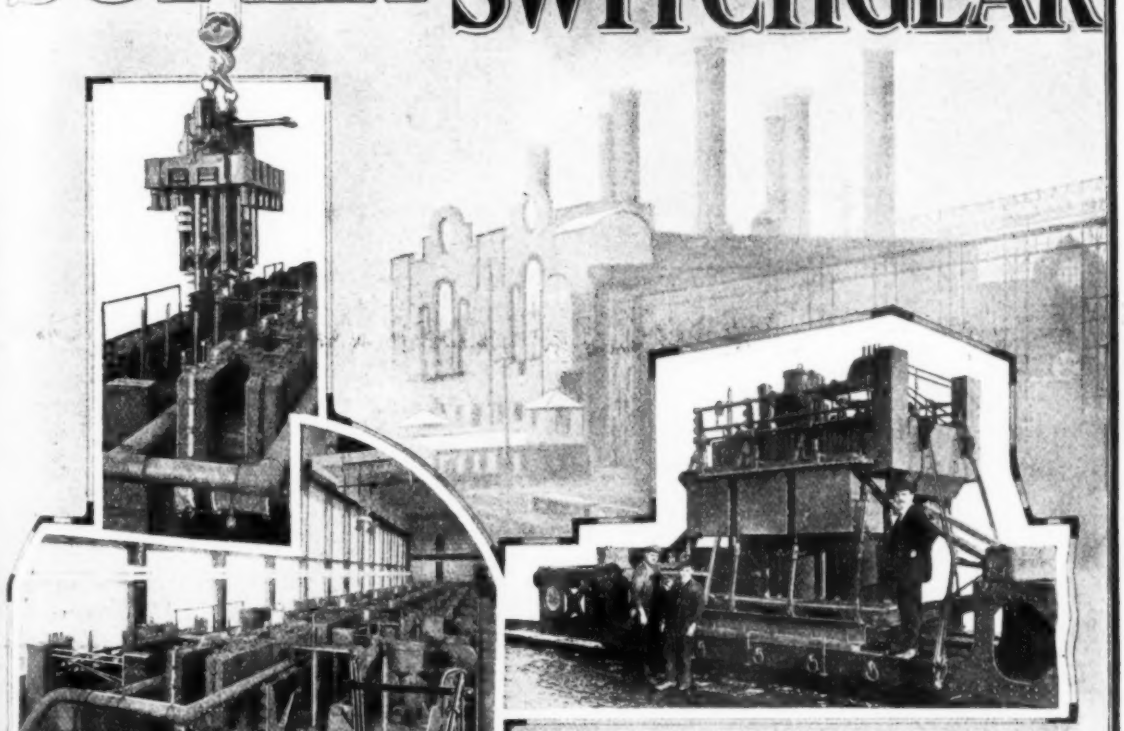

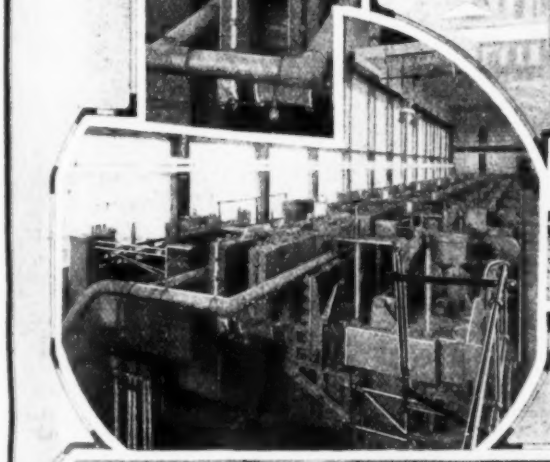

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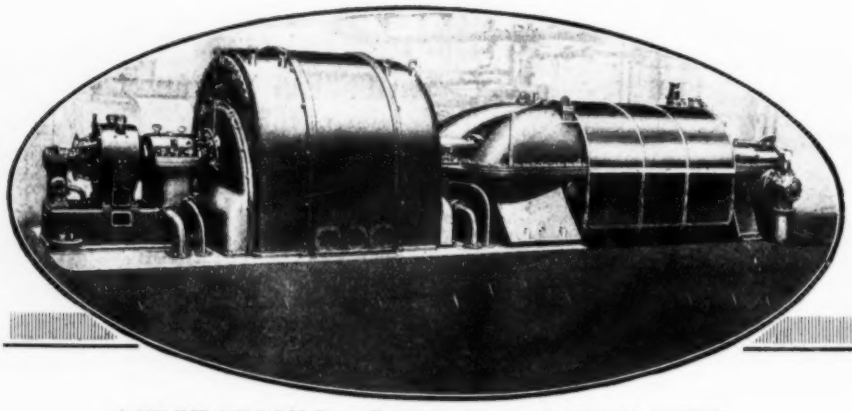

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A Double Pole, Double Throw Switch in which self-capacity has been eliminated. This switch should be employed particularly in High Frequency and Detector Circuits where self-capacity is fatal to efficiency. Retail price **8/-** each.

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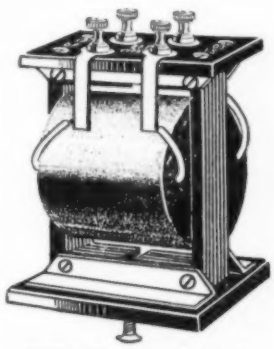

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Ratio 2.7 to 1.

This ratio of Transformer is at the moment in great demand. We can deliver from stock.

The Efesca Speech Amplifying Transformer Type C is designed to give the amplification of a Power Transformer without the loss of purity and reproduction usually inseparable from power amplification. The Coil is wound to neutralise resonant effects while the laminations are carefully insulated from each other to localise eddy currents thus preventing distortion. Amplification ratio 2.7—1. One Hole fixing. Retail Price **25/-** each.

There are also Efescaphone Wireless Receiving Sets for those preferring a factory-made Set. One in stock which you could demonstrate will mean real business for you.

Write for Catalogue No. 522b showing a full range of the Efescaphone Receiving Sets and Efesca Wireless Components.

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SPERRYN & Co
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The Cressall Steel-jacketed Unit Heaters are the size of a two-foot rule and of flat section, taking up very little space. They are ideal wherever heat is required in isolated or exposed places. Already thousands have been sold for Industrial purposes, and each one is fully guaranteed for twelve months. Can be used on D.C. or A C. current and is supplied in 100-110, 200-220 and 230 250 volts. Capacity of 500 watts. WRITE FOR FOLDER B48.

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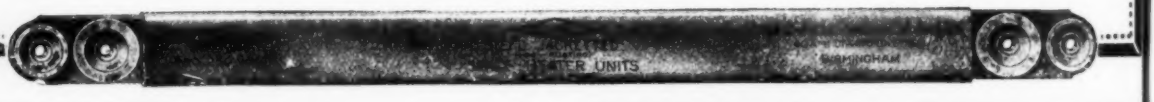

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Samples and quotations upon application.

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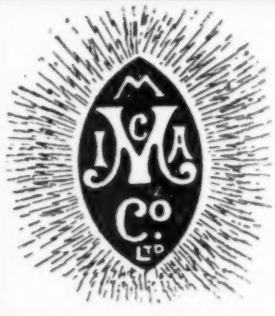

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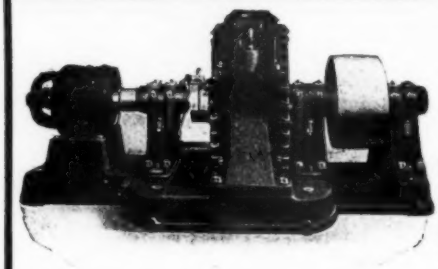

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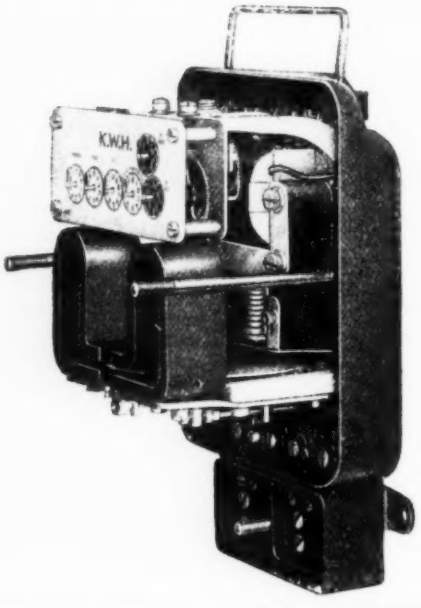

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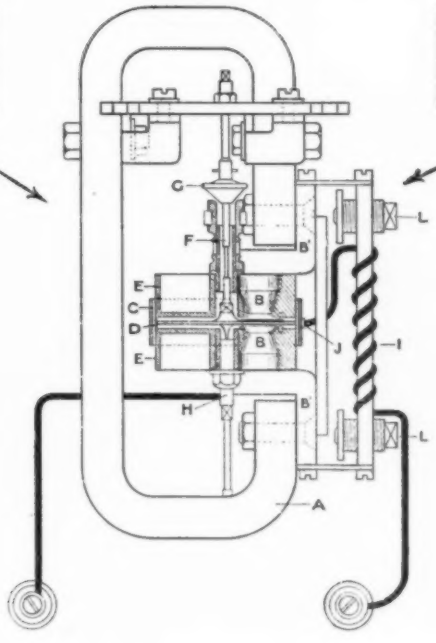

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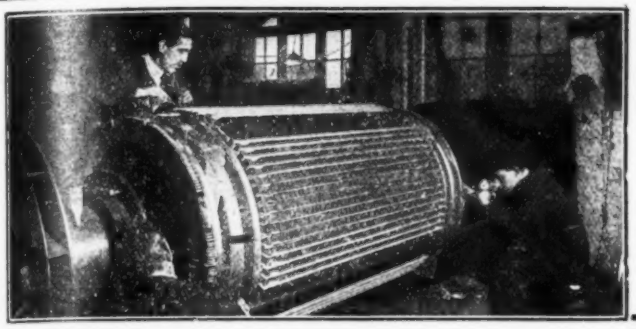

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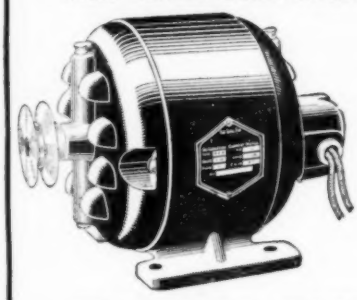

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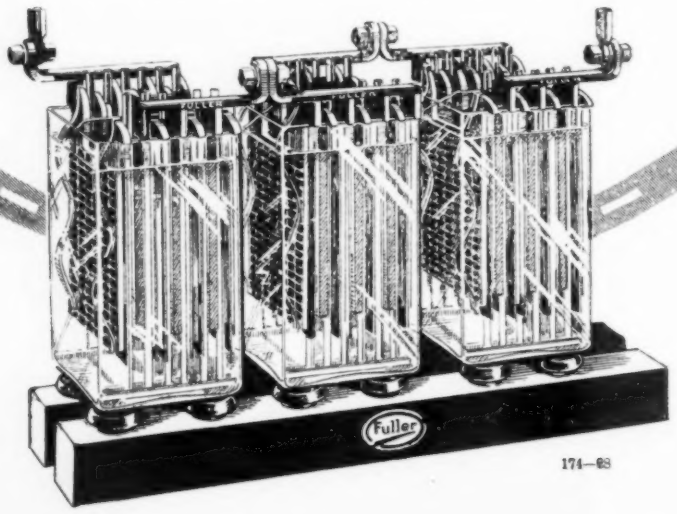

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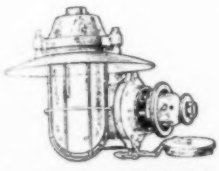

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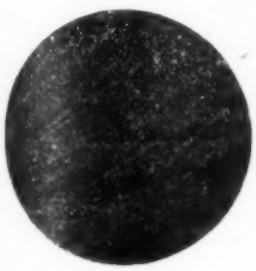

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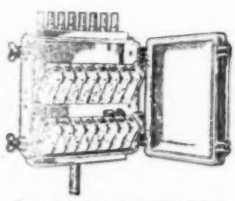

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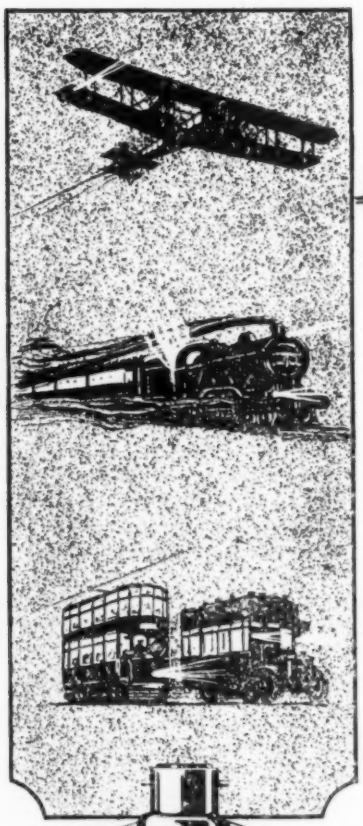

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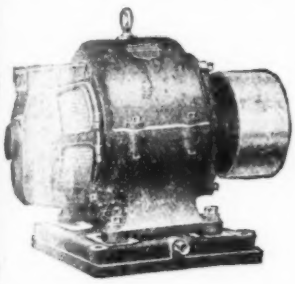

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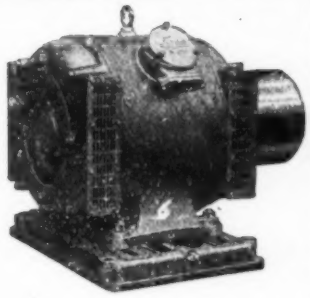

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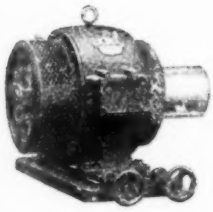

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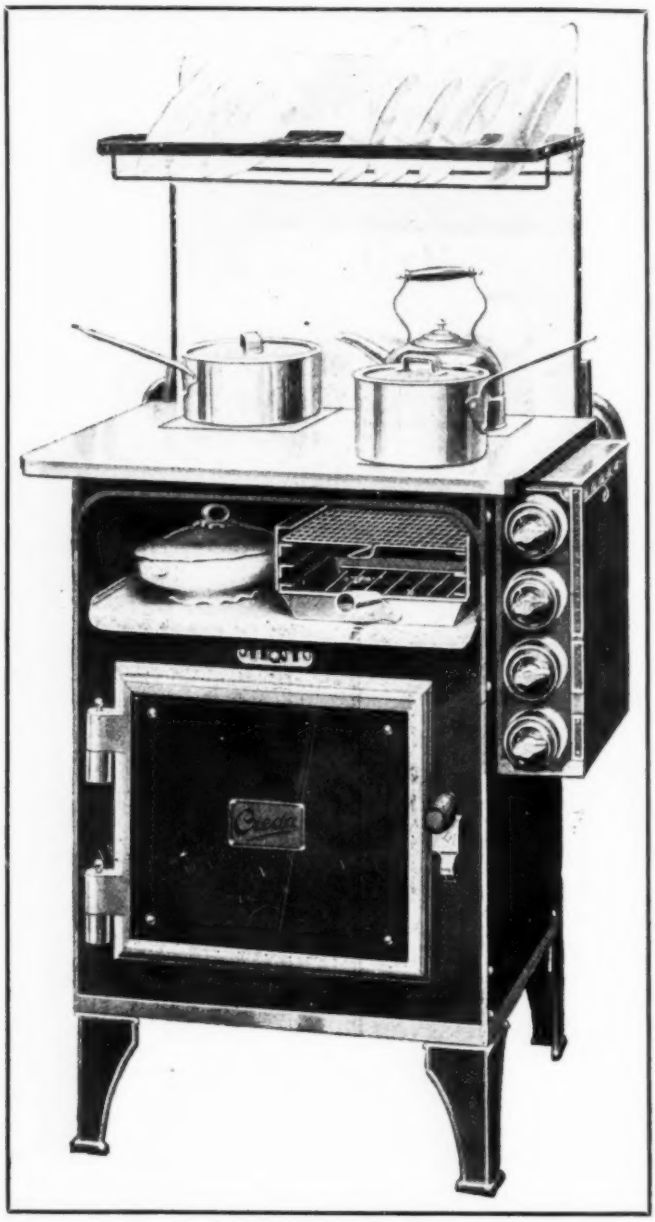

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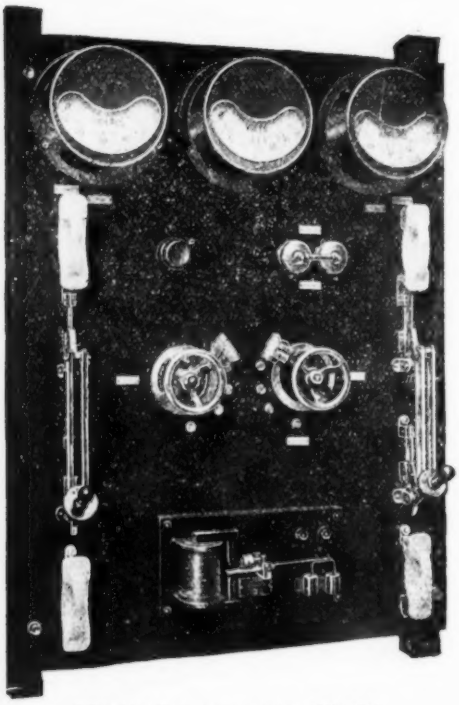

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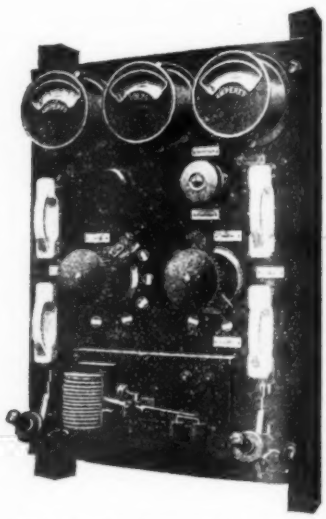

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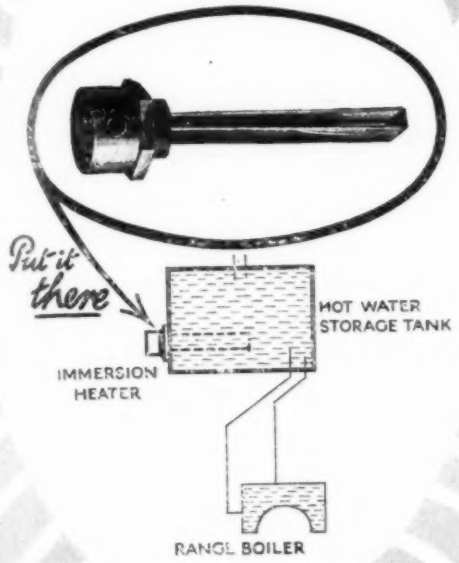

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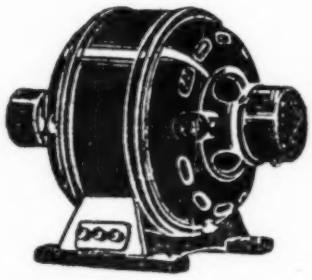

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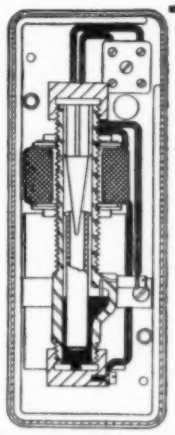

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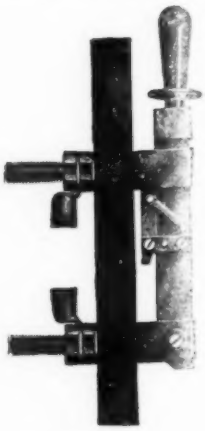

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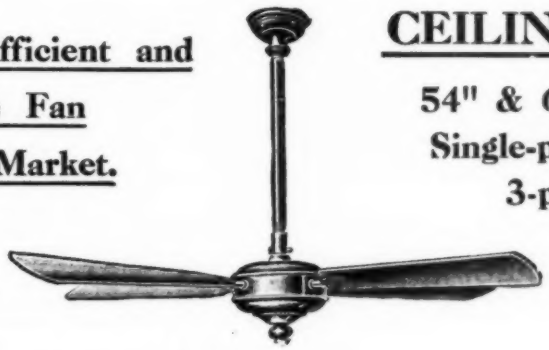

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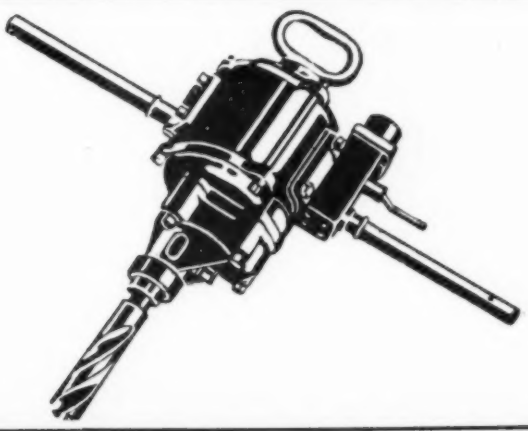

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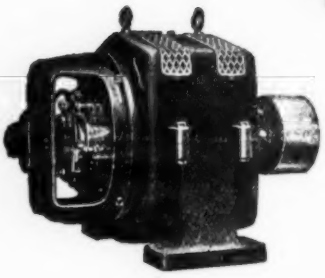

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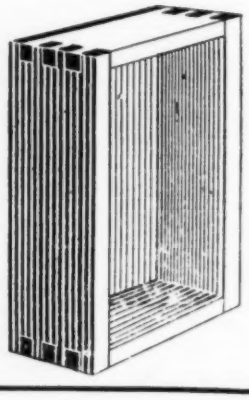

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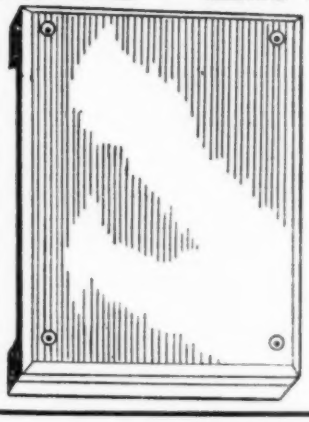

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All Joints Tongued, Grooved and Glued.

Strong battens screwed on back.

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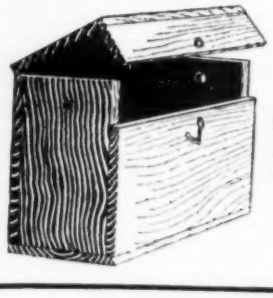

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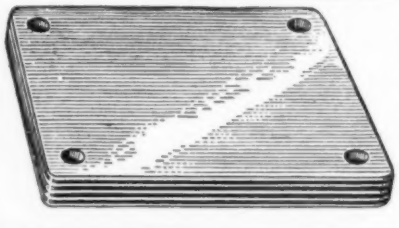

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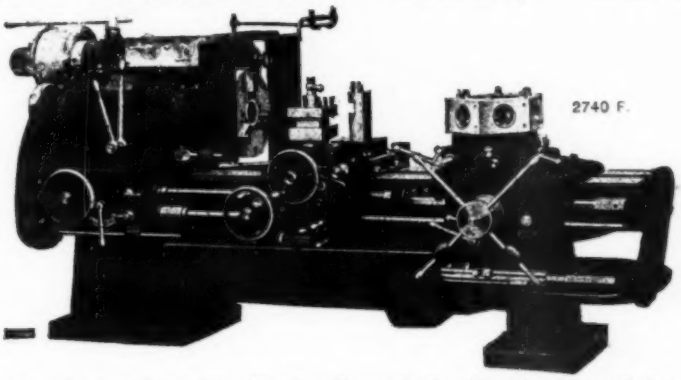

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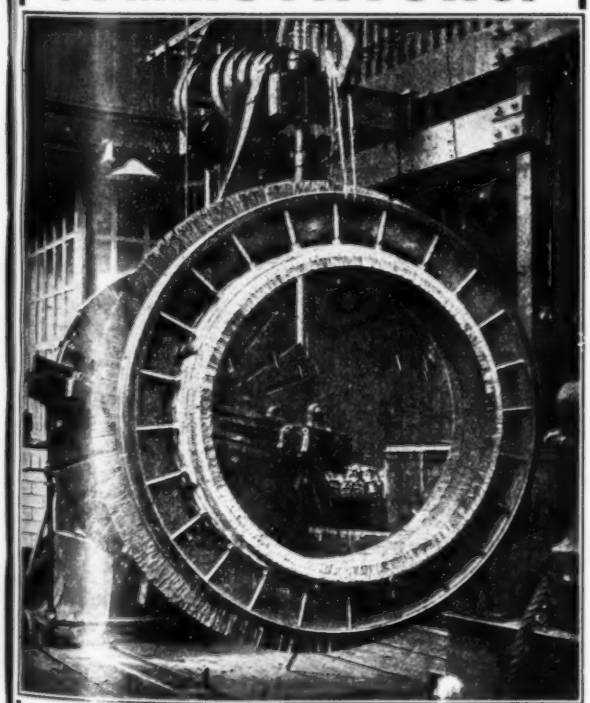

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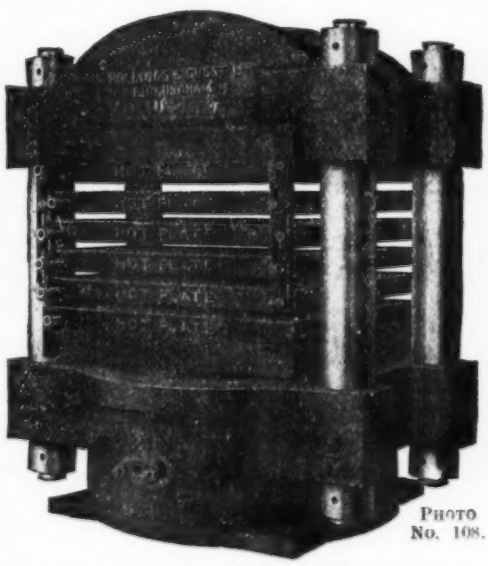

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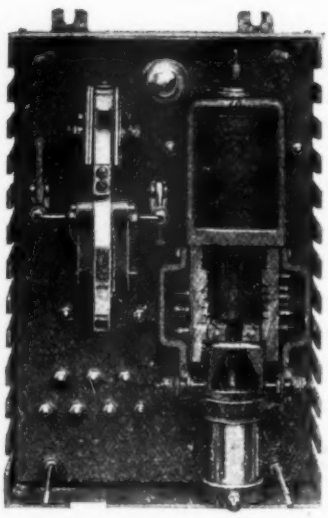

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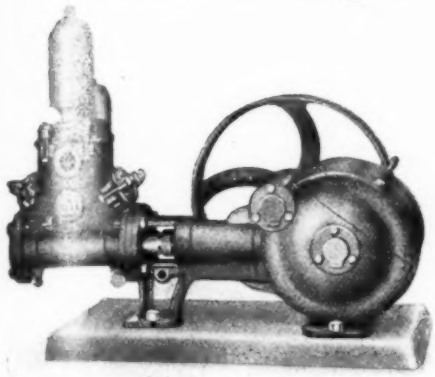

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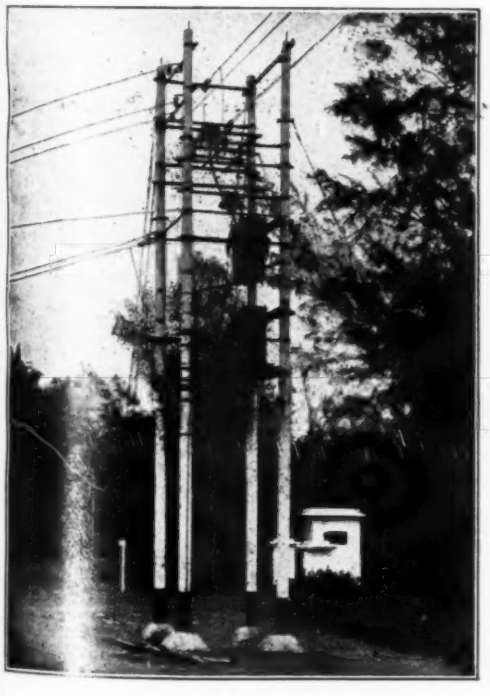

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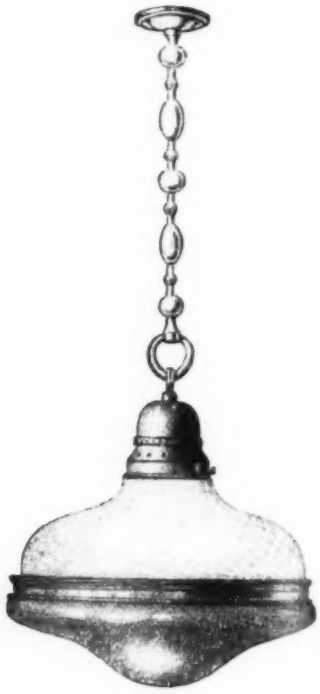

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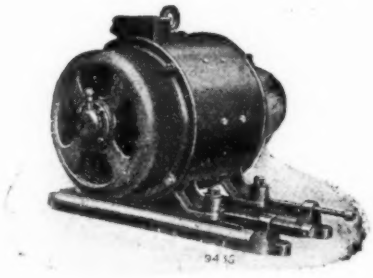
A first-class engineering job



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Built for hard work, dependable operation and high efficiency, they comply in every respect with British Standard Specification No. 168/1923.

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Heathman's folding platform to hook on any ladder in front or at back, to stand on or receive tools, adjusts level at any angle of the ladder **12/6.**

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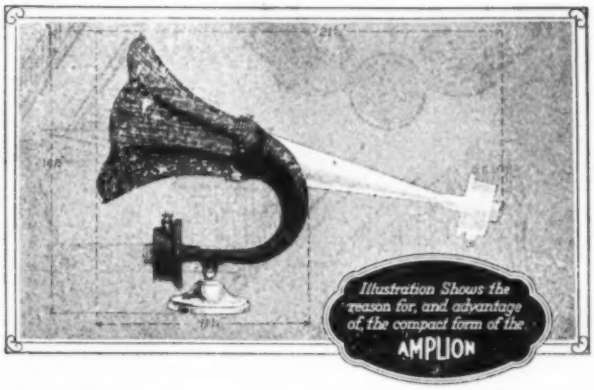
The "DRAGON" SHAPE
An Explanation of interest



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WIRING SYSTEM
Houses
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A simplified rapid &
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THE BETTERWAY

Dining-room Pendant.

SERIES "I."

This Pendant is complete with Ceiling Plate and Chains.

The Flounce hangs perfectly; the White Silk Lining and Bead Trimming give it that "well made" appearance.

FOR ELECTRIC.

SERIES "I."

COLOURS:

RED, ROSE, GOLD,
FLAME, GREEN, BLUE.

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All metal parts are finished Oxidised Copper, Satin Brass, Oxidised Silver.

LENGTH:

48" OVER ALL.

SELLING PRICE:

12" 14" 16"

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OXIDISED COPPER OR SATIN-BRASS.

Trade Discount on Application.

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EXCELSIOR SHADE MANFG. CO.,

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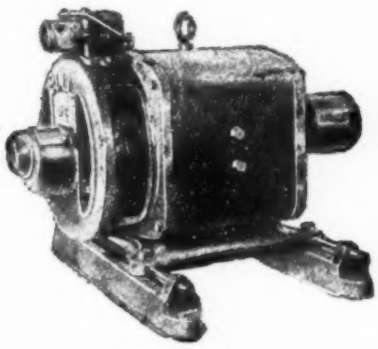
BUYERS of Dynamos and Motors are assured of first-rate quality and the highest efficiency when using "Bull" products.

By carefully selecting only the *best* materials and judicious proportioning of all parts, *very high efficiencies* are obtained, with a consequent saving in the cost of current for a given output.

Open Bracket, Enclosed Ventilated, Totally Enclosed, or Pipe Ventilated machines, can be supplied in all standard voltages up to and including 100 Horse Power, fitted with plain, Ball or Roller Bearings as required.

Quick Deliveries.

Write for Catalogue, which will give you the fullest particulars.



M.S. Open Bracket Type, D.C.

BULL MOTORS

LTD.

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Telephone: City 8900/1. Telegraphic Address: "Agrangio, Estrand," London.

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Telephone: Central 2442. Telegraphic Address: "Frequency," Birmingham.

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Telephone: Rusholme 1883.

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Telephone No.: 4767. Telegraphic Address: "Eclipse," Bristol.

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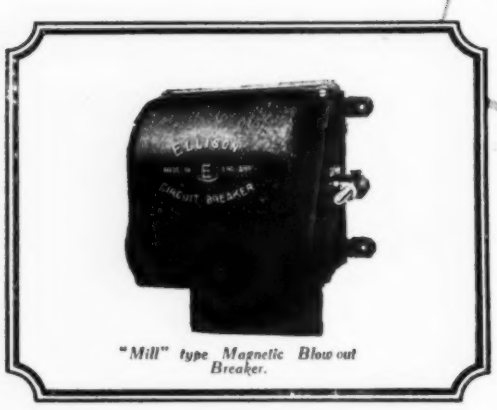
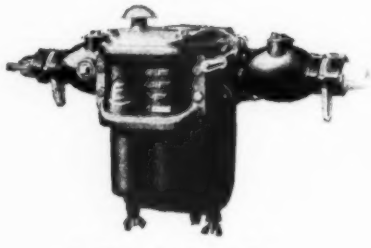


"Mill" type Magnetic Blow out Breaker.

TRADE MARK



An Oil Breaker for Distribution Boards, Lighting and Small Power Circuits.

CIRCUIT BREAKERS
are necessary to protect
ELECTRIC MOTORS

A Circuit Breaker is the only practical means of protecting motors and motor-driven machinery against overloads. This breaker must be well made and have properly proportioned automatic releases with time lag retarders to restrain their action on momentary load peaks.

Fuses do not protect motors against overloads. If fuses are used, they must be heavily wired or frequent stoppages occur. If fuses are heavily wired then larger motors than necessary for the load have to be employed to safeguard against burn-out, with consequent loss of money because of poor efficiency and power factor.

"ELLISON" BREAKERS are standardised as follows:

Ironclad A.C. High Pressure;
Ironclad air and oil-break for A.C. & D.C.
Medium and Low Pressures, and Open Type for Panel Mounting.

Write for the "Ellison Booklet" which gives more information on the necessity for Electric Circuit Breakers.

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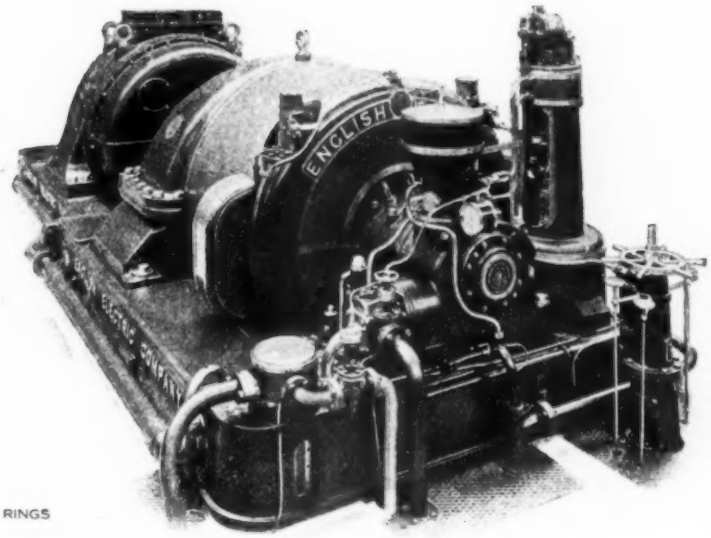
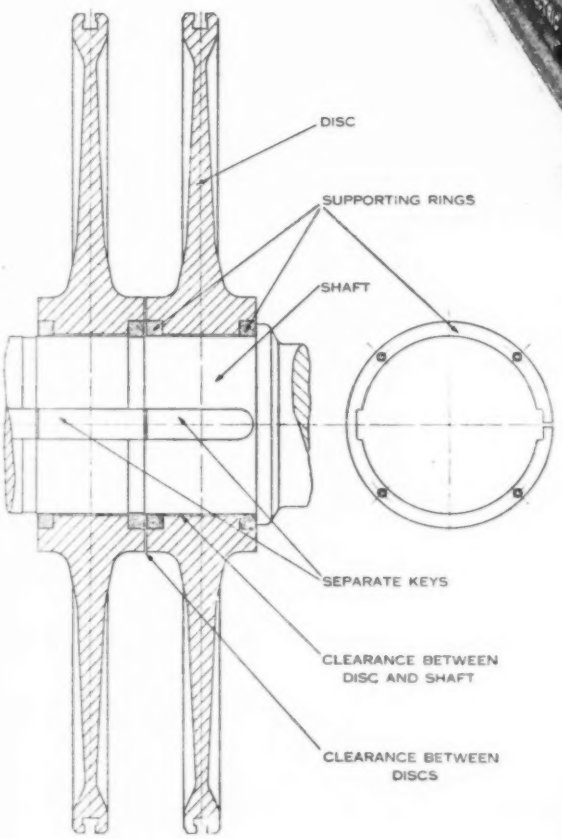
"English Electric"
STEAM TURBINES



SECTION THROUGH DISCS SHOWING METHOD OF FIXING BY SUPPORTING RINGS.



The "English Electric" Design of Turbine Wheel Support has the following advantages :—

(1) Wheels supported in this way are always tight when put on because—
They are not mounted on cones; they are not shrunk on; a perfect fit is assured, as each supporting ring is specially made and gauged to suit diameters of shaft and wheel; the supporting rings are small, and the power required to force them home can be easily applied and accurately measured.

(2) Wheels supported in this way cannot become loose in service because—
Each wheel is clear of the shaft, consequently, shaft flexure will not cause slackness; each wheel is supported at two points where the wheel material is lightly stressed, consequently centrifugal force will not cause slackness.

(3) Shaft Distortion is avoided because—
Each wheel is independent and does not touch its neighbours; each wheel is located and keyed to the shaft separately; sudden changes of temperature are slowly but uniformly communicated to the shaft owing to small surfaces in contact.

To Overseas Customers.

Wheels are very easily removed and replaced. If new supporting rings are required they are easily made in any local workshop. Supporting rings can be easily forced in without a special press.

TURBINE ADVT. SERIES, No. 5.

Write for Publication 225.

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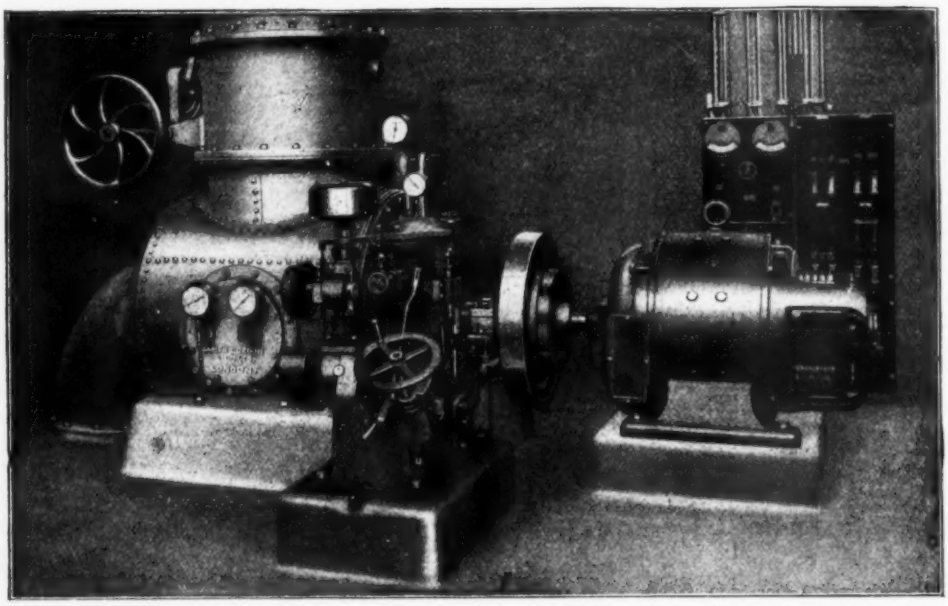

GORDON SINGLE-DISCHARGE TURBINE with OIL-PRESSURE GOVERNOR and DIRECT COUPLED GENERATOR.
Suitable for TOWN ELECTRICITY SUPPLY or MILL-POWER GENERATION.

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Fittings Made to B.E.S.A. Standards.

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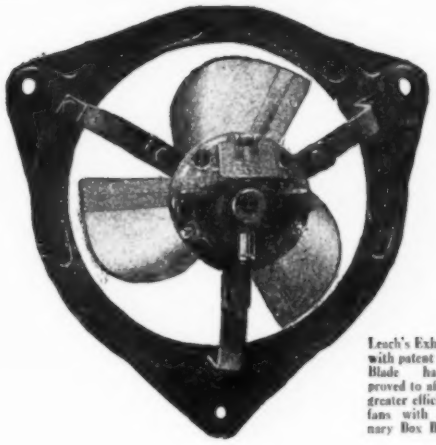
FANS



Leach's Exhaust Fans with patent "Beedle" Blade have been proved to afford 50% greater efficiency than fans with the ordinary Box Blade.

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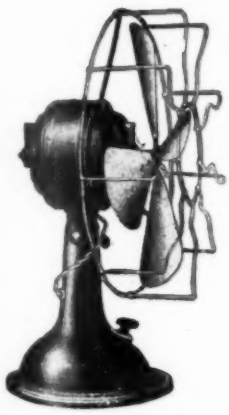

LEACH'S Fans will help you to get good orders. There's a type that will exactly suit each one of your customers' requirements.

You can get quick delivery, too, if you send your orders NOW. Don't postpone doing so, for although Leach's hold one of the largest stocks in London, supplies are rapidly being depleted owing to the recent warm weather.

Remember, too, that every Leach Fan is guaranteed, and that you can rely on any model giving perfect satisfaction to your customers.

A fan bearing the name LEACH means that it is the very best of its kind. ***Even so you will find that its price is highly competitive.***

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Have particulars of all our Fans ready by you. We have a range which covers positively every requirement. Our prices, too, will enable you to quote highly competitive prices, and our fans are all guaranteed.

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PLEASE SEND FOR COMPLETE LIST AND TRADE TERMS NOW.

LEACH'S FANS have set the standard of excellence for over 20 years.

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that cosy warmth *quickly* aids a deal. Business conducted in comfort is the more likely to be satisfactory. There must be scores of men in your locality you could reach by making suitable window displays—write us for particulars.

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An Electric Fire, in cast iron, with circular dome-shaped reflector of copper in polished nickel-plated finish, centre formed of spherical shaped element of highly refractory material, with spirally-wound nichrome resistance wire.

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PROMPT DELIVERIES.

EFFICIENCY GUARANTEED.

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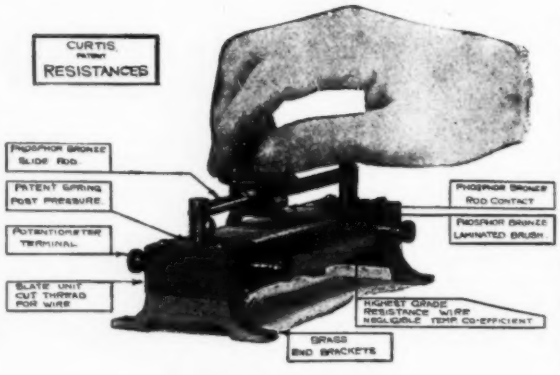
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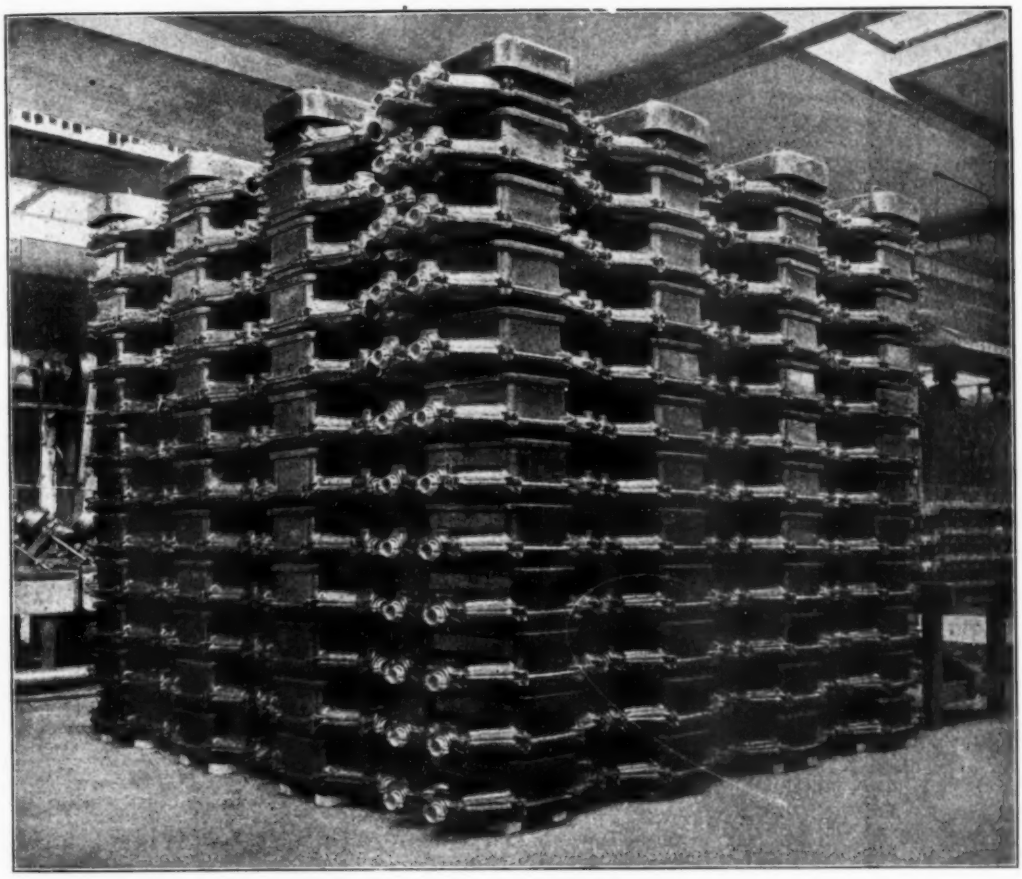
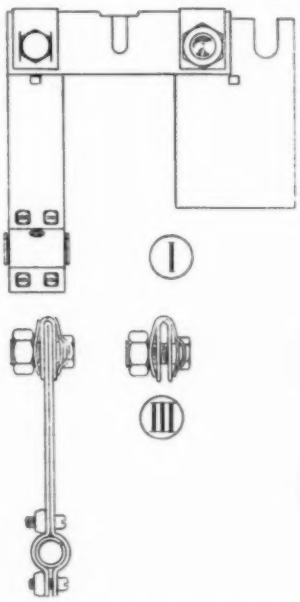


A stack of Henley Link Disconnecting Boxes waiting Shipment.

Four features

which have contributed to the instant success of Henley Link Disconnecting Boxes.



I.
Hard rolled, high conductivity copper fittings only are used—100% better conductivity and no blow holes.

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One piece copper Busbar and Terminal—the only contacts are those you want.

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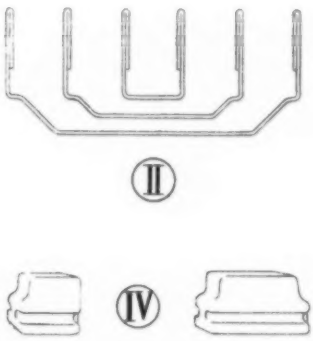
A really efficient disconnecting Link—easy operation, no shorts.

IV.
Coloured porcelains to identify poles or phases—no crossed cores.



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LINK DISCONNECTING BOXES

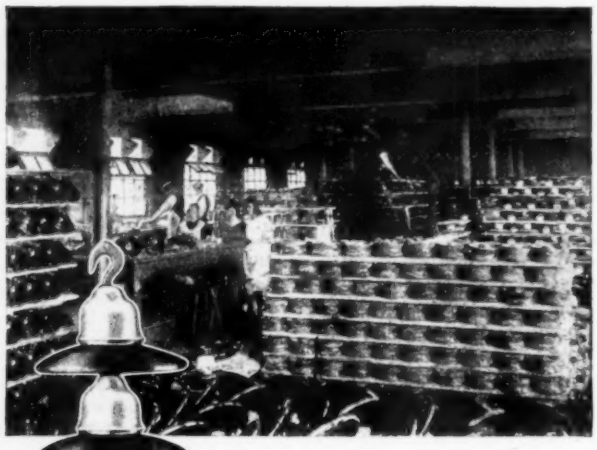
(Pat. No. 205,741)

Ask for List W.B. 1.

B. 7 *W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., HOLBORN VIADUCT, LONDON, E.C. 1.*

TRADE MARK

BEHIND THE SCENES (SERIES 2) NO. 3



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WORKS equipped for the production of every conceivable form of porcelain insulation. A staff of designers and engineers who have never yet failed to design and produce a suitable insulation against a practicable enquiry. And a management fully aware that prices must be competitive.

This is the service offered to users of porcelain insulation by Bullers, electro-technical potters from the inception of the electrical industry.

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WITH

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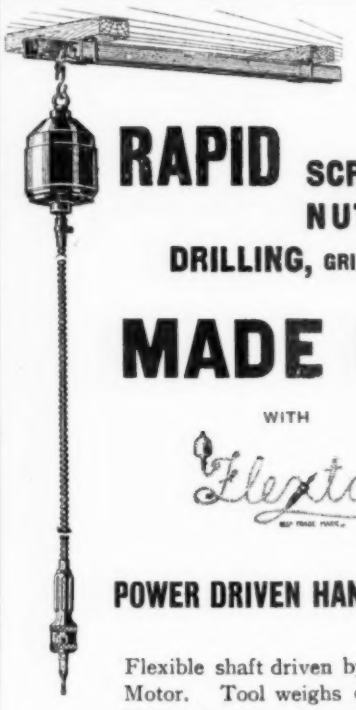

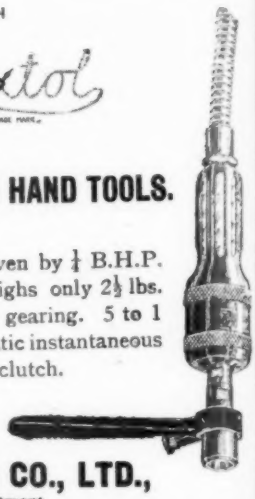

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Flexible shaft driven by ¼ B.H.P. Motor. Tool weighs only 2½ lbs. No tooth or worm gearing. 5 to 1 reduction. Automatic instantaneous friction clutch.

Full particulars from—

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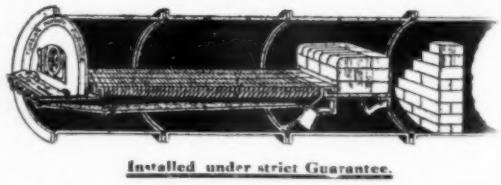
It had been running for some time too! It ran into three figures a week, until the

TURBINE FURNACE

cut it out. The Turbine Furnace not only cut out the loss, but it put in a very substantial profit in its place.

We are again SHOWING at WEMBLEY.—Come and see us!



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Write for particulars, cut out this advertisement and slip it into an envelope after filling in your name and address, and post to us and we will send you some interesting facts and tell you how we can help you to cut out losses on your fuel bill and to increase your steam output.

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E.R. Address .....

The . .
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A property for which "BROOK MOTORS" are constructed and is already demonstrated by their performance after over 20 YEARS' constant service.

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LONG LIFE and EFFICIENCY MAINTAINED.

BRITISH! THEREFORE THE WORLD'S BEST.

The Lamp illustrated is the "Stella" Half-Watt Type with double wreath filament. It cannot be denied that the efficiency and life of this type of lamp, particularly when used on voltages from 200 to 250 volts, in wattages of 40 to 100 watts, is the best and most dependable.

100/130 Volts,	30 or 40 Watts	2/3	200/250 Volts,	40 or 60 Watts	2/9
" "	60 Watts	2/9	" "	100 Watts	4/-
" "	100 Watts	4/-	" "	150 Watts	6/-

EXCEPTIONAL DISCOUNTS TO THE TRADE.

Manufacturers of Half-Watt Type, Traction, Metal Filament (Standard), Sign Lighting, Auto, Fancy, Decoration and Carbon Filament Lamps.

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Depots in all principal towns in United Kingdom.

PORTABLE OR TEST ROOM MULTICELLULAR ELECTROSTATIC VOLTMETER.

The KELVIN

ELECTROSTATIC VOLTMETERS

are justly famous all over the World.

The MULTICELLULAR Instrument for low tension forms the recognised LINK between A.C. and D.C. Voltages.

Its readings are independent of wave form and frequency, and its accuracy is permanent.

Our pamphlet No. 5 gives full particulars and ranges.

PLEASE SEND FOR IT!

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MANUFACTURERS OF THE LATE LORD KELVIN'S INVENTIONS AND OTHER INSTRUMENTS

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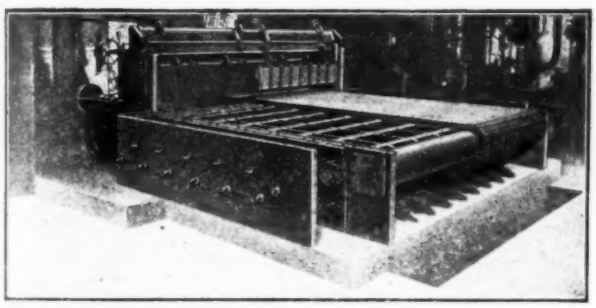
ILLINOIS CHAIN GRATE STOKERS

ALL BRITISH MANUFACTURE.



SINGLE UNITS IN ANY SIZE.

STOKERS 20 FEET WIDE BY 18 FEET LONG INSTALLED IN THIS COUNTRY.

SOLID SUBSTANTIAL CONSTRUCTION.

WILL BURN *ANY* FUEL WITH MAXIMUM EFFICIENCY.

AUTOMATIC IGNITION FOR LOW VOLATILE AND HIGH ASH COALS.

ILLINOIS FLAT SUSPENDED ARCHES AND ILLINOIS WATERBACK.

NEW EDITION OF CATALOGUE NOW READY FOR DISTRIBUTION.

Send your Combustion Problems to Sole Manufacturing Licencees for Great Britain and the Colonies, etc.—

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FOR INDOOR AND OUTDOOR SERVICE

Complete Range of Apparatus up to 150,000 V comprising:

KNIFE SWITCHES up to 10,000 amps.
AIR BREAK CIRCUIT BREAKERS up to 10,000 amps.
OIL IMMERSED SWITCHES.
RELAYS.
INSTRUMENT TRANSFORMERS.
ISOLATING SWITCHES.
HORN BREAK SWITCHES for pole mounting.
SURGE PROTECTING APPARATUS.
FUSES for low and high voltage.

Illustration shows typical design of

POLE MOUNTED TRANSFORMER

with High and Low Tension Fuses built in sizes from 5 to 25 kVA, 12,000 V, with Lightning Arresters for economically tapping E.H.T. transmission lines for small consumers in rural areas.

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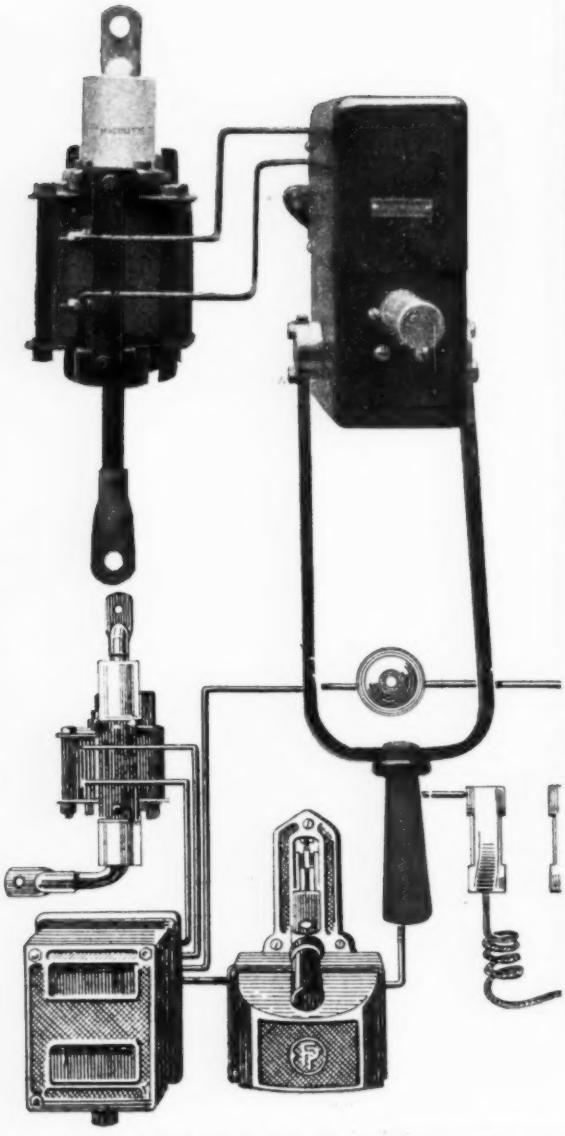
Scottish Representatives: CLARKSON, HOOD & CO., Atlantic Chambers, 45, Hope St., GLASGOW.

SWITCHGEAR SPECIALISTS

F·P·Super Sensitive Tripping Device



The patent F.P. super-sensitive tripping device here illustrated is operated by the fault current direct. It can be set to trip down to 30 amperes primary current using ring type current transformers. Its power consumption is one volt amp.; it has a true loose handle movement and hesitation trip arrangement to prevent arc drawing. It can be readily fitted to any make of circuit breaker.

No relays, batteries, auxiliary contacts, etc. (admittedly weak links) are required.

The principle of operation is that stored mechanical energy is used to trip the breaker. The protective transformers have merely to release this mechanical energy.

Ferguson Pailin Ltd.

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Telephone: Openshaw 328 (Three lines) Telegrams: Tension Manchester

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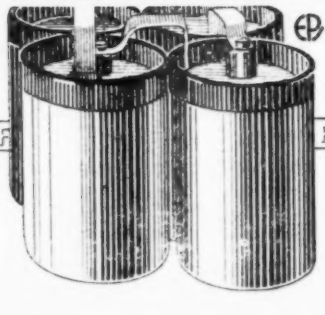
Sprott Road, Ballard Estate, Bombay.

12



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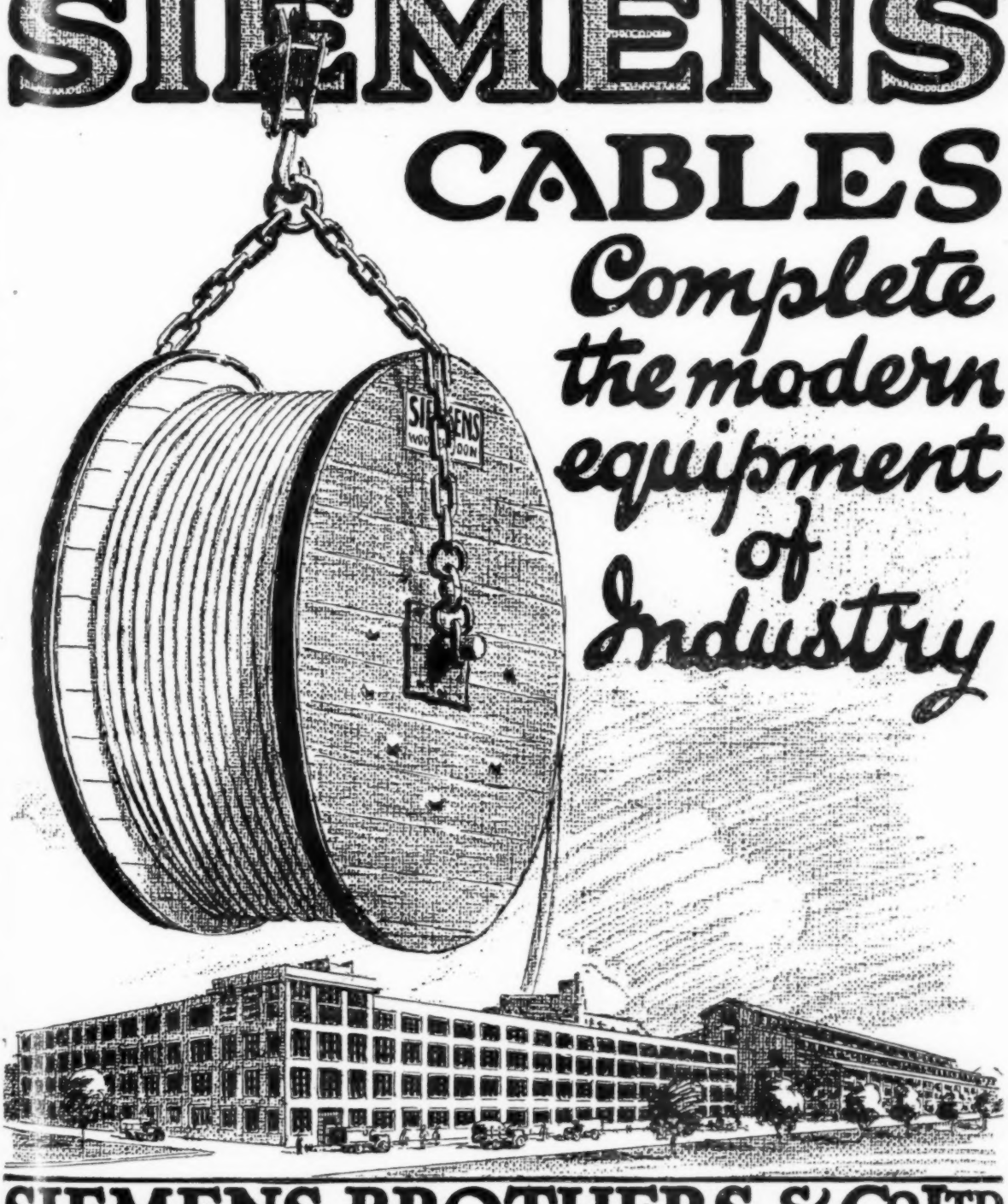

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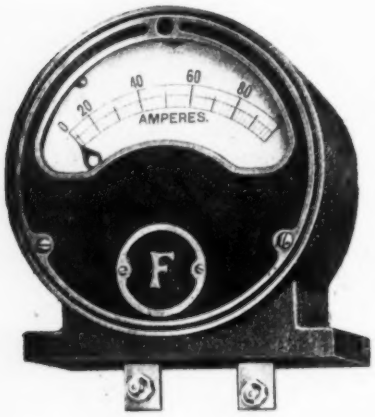

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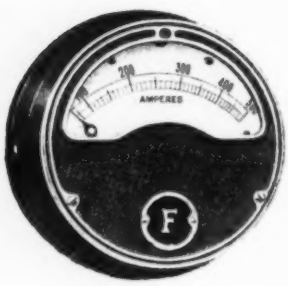
4", 6" & 8" Dial Moving Iron Instruments for A.C. or D.C. Circuits

ARE UNRIVALLED FOR GOOD DESIGN, HIGH-CLASS WORKMANSHIP AND ATTRACTIVE AND LASTING FINISH. THEY EMBODY MANY UNIQUE FEATURES, AMONGST WHICH THE FOLLOWING ARE WORTHY OF SPECIAL NOTE:—



1.—Pressed steel covers and bases combine MAXIMUM strength with MINIMUM weight, effectively shield the movement from the influence of external magnetic fields and give a dust and damp proof metal-to-metal joint.

2.—The scales, which are exceptionally uniform, are printed in bold type on the white, washable surface of a specially-treated metal dial which cannot warp or chip.

3.—Positive indications are obtained and sticking prevented by the adoption of a high ratio of torque/weight of the air-damped moving parts which are as light as is compatible with robustness, thus reducing the energy CONSUMPTION to a MINIMUM.

4.—All instruments are subjected to a pressure test of 2,000 volts alternating for one minute.

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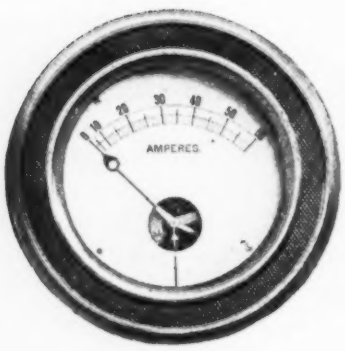

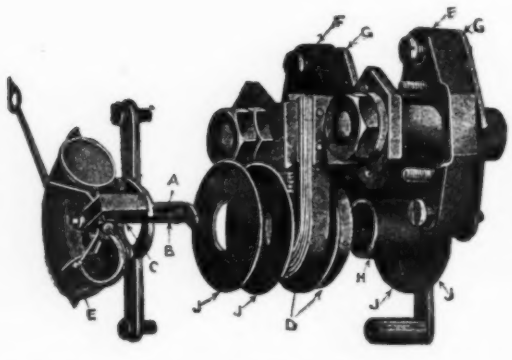

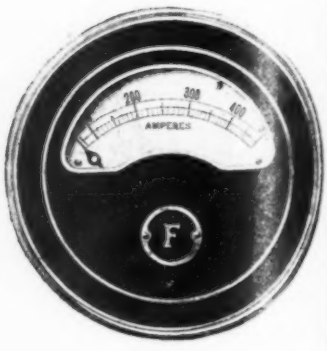

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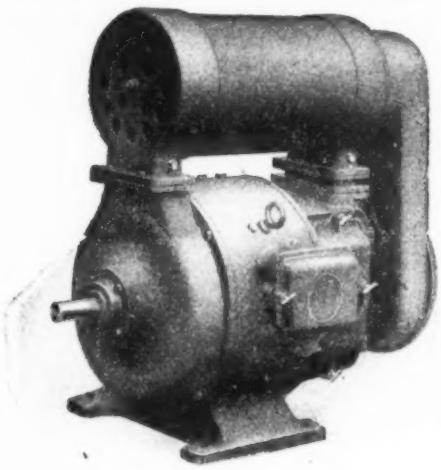

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It is a real dust and watertight machine.

It uses the active material to the best advantage.

It consequently has a high efficiency.

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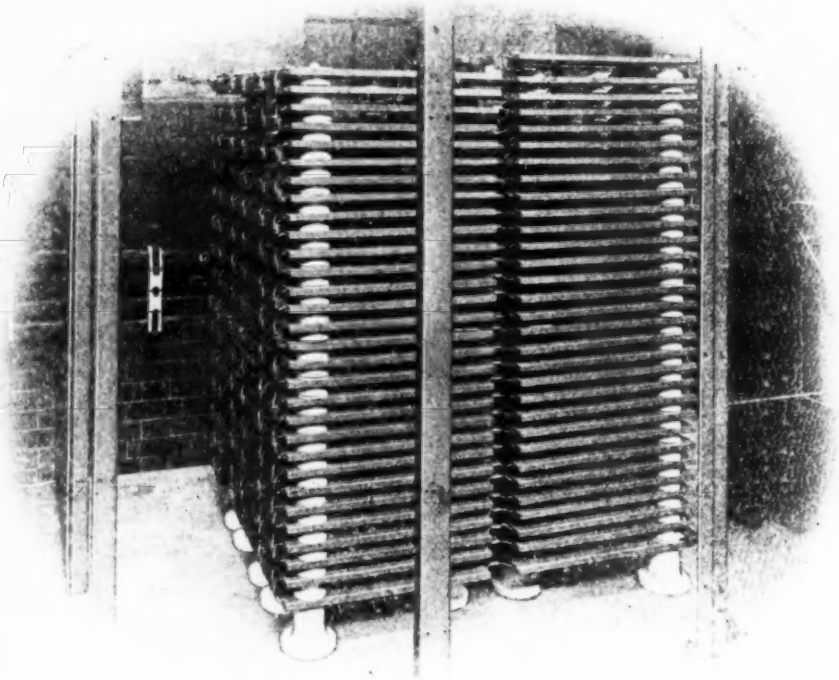
CARBON SLAB EARTHING RESISTANCES

For the Neutral Point of Three Phase Systems.

The resistance illustrated has been supplied to a large Power Company and will carry 330 amperes (6,300 kW) on a 33,000-volt system.



Carbon Slab Resistances possess the following advantages over other forms of Earthing Resistances :—

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2. **They are of fireproof material** throughout giving perfect insulation, no metal being employed in their construction.
3. **They have a negative temperature** co-efficient, the current gradually increasing until the circuit-breaker acts, thus minimising disturbance to the system.
4. **They can be adapted for different currents and voltages,** the units being easily re-grouped to increase or reduce the current to earth.
5. **They are extremely compact and occupy less space** than any other form for a given rating.
6. **There is no limit to the current or voltage** to which they can be employed.
7. **The initial cost is low** and there is **no maintenance charge.**
8. **They will safely withstand any fault currents,** provided the protective apparatus operates within two minutes.
9. **They are non-inductive,** have a **large thermal capacity,** have **no reactive effect,** and **maintain their ohmic stability.**

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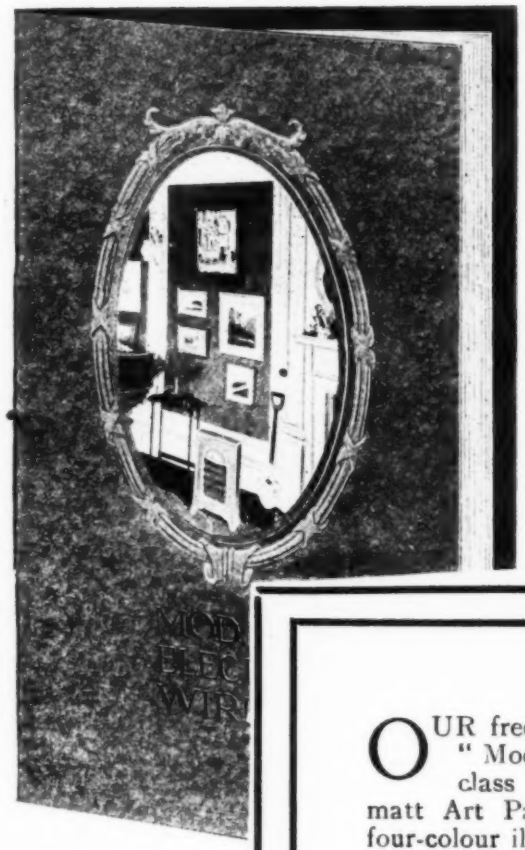

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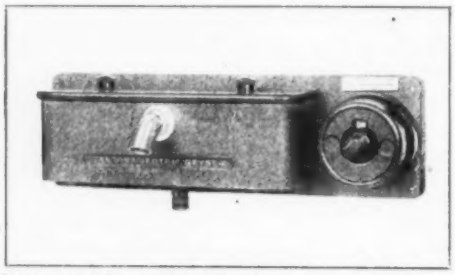

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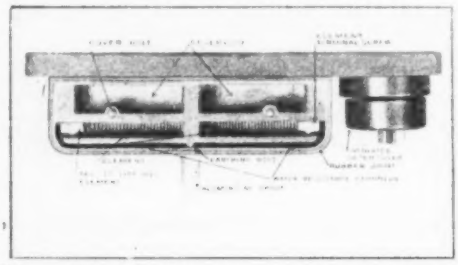

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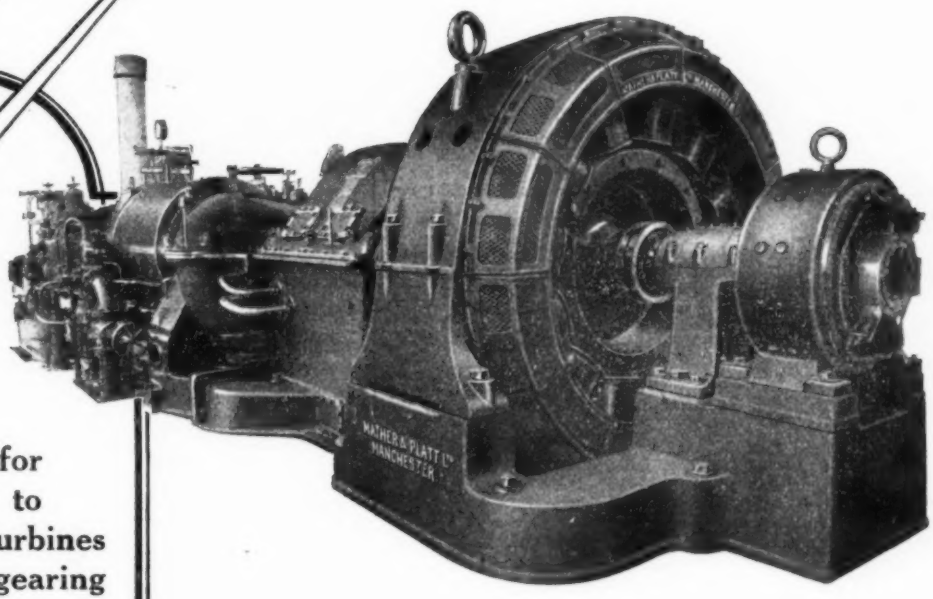
A.C. Geared GENERATORS



—suitable for coupling to steam turbines through gearing

MATHER & PLATT A.C. Generators are designed throughout to meet the most exacting conditions, both electrical and mechanical, required in this class of machine.

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There is added reliability, too, in the design, when it is a Mather and Platt Set.

The Chief Engineer **of a Corporation Power Station, speaking of a Mather & Platt combined A.C. and D.C. Geared Generating Set, stated that its installation had resulted in a very substantial fuel saving per unit generated—viz., 43%. The Set in question has borne practically the whole output of the Station night and day for fifteen months.**

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CONTRACTORS' COLUMN.

[The following information is published in the interests of electrical contractors and others who are seeking for openings for new business. Considerable expense is incurred in the production of this column, and every care is taken to ensure that the information is new and accurate, but it will be understood that in a matter where so many correspondents are engaged, and where the amount of information to be handled is very large this cannot always be guaranteed. If alleged inaccuracies are reported to the Editors, they will be fully investigated.]

AMBERGATE (Derbyshire).—Wesleyan church and schools; trustees.

AYR.—Houses, Bellvale Avenue (£5,400), for D. & J. Meikle.

BATH.—Bazaar premises, Stall Street, for F. W. Woolworth & Co., Ltd., Kingsway, London.

BIRMINGHAM.—Housing scheme, Berkeley Road, Hay Mill, for U.D.C.; H. H. Humphries, city engineer. Secondary school, King's Norton; education architect. 212 houses, for police, on various sites; city engineer. Bank, Birtal Road, Northfield; Corporation Bank Committee.

BLACKPOOL.—Destructor, off Fleetwood Road, Bispham; borough surveyor. Club and institute, Layton (£10,000); Mercer & Duckworth, architects.

BLYTH.—Extensions, Hippodrome, Peck Street; Mr. Tudor.

CHELMSFORD.—Extensions to offices for the R.D.C.; James Dewhirst, surveyor, Waterloo Lane.

CHESTERFIELD.—Development of estate, Newbridge Lane; W. A. Derbyshire. 37 houses, for rehousing scheme; borough engineer.

CLITHEROE (Whalley).—Garage, waiting room, and assembly hall, King Street, for the Lancashire Industrial Motors, Ltd.

COCKERMOUTH (Cumberland).—Additional 72 houses, for the R.D.C.; surveyor.

DENSTONE (Staffs.).—Additions, Denstone College (£4,000); clerk to the governors.

DORCHESTER.—Branch office, London Road; Anglo-American Oil Co., Ltd.

DUDLEY.—Town hall (£44,840), for the T.C.; John Dallow & Sons, builders, Blackheath, Birmingham.

DURHAM.—Housing scheme (44), Whinney Hill, for City Council; J. W. White, builder, Sunderland.

EARLESTOWN.—Housing scheme (50), Brunswick Road site, for the U.D.C.; surveyor.

ESHER (Surrey).—Housing scheme (50), for the U.D.C.; H. C. Fread, surveyor.

GLASGOW.—Hall in Errol Street, for Ancient Order of Hibernians; the secretary. Kinema in Plantation (£17,000); Mrs. S. A. Robinson, 4, Ethel Terrace, Langside. Bank in St. Vincent Street (£250,000), for Union Bank of Scotland; the manager.

GODALMING.—Sanatorium, Milford, for Surrey C.C.; S. Tatchell, architect, Bank Chambers, 32, Strand, London, W.C.2.

GUISELEY.—School; West Riding education architect.

HANWELL.—Housing scheme, Hopefield estate; U.D.C. surveyor.

HARPENDEN (Herts.).—Blocks of maisonettes, Park Rise, for J. Catton.

HELENSBURGH.—Showroom and garage; McFarlane & Gilmour.

HERNE BAY.—Re-erection of Town Hall, for the U.D.C.; B. J. Wormleigh, surveyor.

HORDEN (Co. Durham).—Houses (57), for G. Riddell, Easington.

HULL.—Infectious diseases hospital; city engineer. Soap works extension, Foster Street; British Soap Co., Ltd. Extensions, Hymens College; governors. 40 houses, James Reckitt Avenue; Reckitt and Sons, Ltd.

INCE.—School (£6,674), for Cheshire E.C.; R. Beswick, county architect, Newgate Street, Chester.

KING'S LYNN.—Additional housing scheme, for the T.C.; borough surveyor.

KIRKWALL.—Housing scheme, for the T.C.; burgh surveyor.

LEAMSIDE (Co. Durham).—School; F. Willy, county architect, 34, Old Elvet, Durham.

LIVERPOOL.—Kinema, for John George Wellings, 9, Sweeting Street.

LONDON (Brockley, S.E.).—Business premises, for the Royal Arsenal Co-operative Society, Woolwich; William B. Nevill, secretary.
(Catford, S.E.).—21 houses, Bellingham Road; H. R. Watt.
(Charlton, S.E.).—Elementary school; L.C.C. education architect.
(Lewisham, S.E.).—44 houses, Brightling Road, and 24 in Bexhill Road; A. J. Glock.
(Shoreditch, E.).—Extensions, clothing factory, Rivington Place; Messrs. Rego.
(East Ham, E.).—Extensions at refuse destructor works; borough engineer. 20 houses, Hertford Road; H. C. Seymour. Girls' secondary school, Plashet Grove, for the borough E.C.; borough engineer.
(Brentford, W.).—Factory extension; York Mineral Water Co.

LONDON.—*Continued.*
(Barnes, S.W.).—Factory extension, Station Road; John Barker & Co., Ltd. 50 houses; Frend, Houchin & Co.
(Mortlake S.W.).—Elementary school; Barnes and Mortlake surveyors.

LUTTON MARSH (Lincs.).—Primitive Methodist church; trustees.

MANCHESTER.—Nurses' home at Royal Infirmary; general superintendent and secretary. Housing scheme (500) at Moston; director of housing to the Corporation, Town Hall. Library at Withington; city architect, Town Hall.

MARGATE.—Housing scheme (150), for the T.C.; A. E. Borg, borough surveyor, Grosvenor Road. Bazaar premises, High Street, for F. W. Woolworth & Co., Ltd., Kingsway, London, W.

MARKET DRAYTON.—Housing scheme (24), Alexandra Road estate; surveyor to U.D.C.

MARLBOROUGH.—Housing scheme, for the R.D.C.; J. W. Brooke, architect, 21, The Green.

MELKSHAM (Wilts.).—Reconstruction of Town Hall, for the U.D.C.; R. J. Pearce, surveyor.

MOLD.—Kinema, with shops, offices, &c., Chester Street (£8,000), for a company; Mr. Tongue, architect, Southport.

NEWPORT (Salop.).—Theatre, New Street, for S. H. Cobb. Council hall for the U.D.C.; surveyor.

NORTHAMPTON.—Additional housing scheme (32), for the R.D.C.; G. Wilcox, surveyor.

NORTHUMBERLAND.—Joint hospital; county medical officer.

NORTHWICH.—Central schools, Darwin Street, for Cheshire E.C.; R. Beswick, county architect, Newgate Street, Chester.

OLDHAM.—Additional 110 houses, for the R.D.C.; Mr. Ashurst, borough surveyor.

OLLERTON.—School at new colliery village; Warwick county architect.

OTLEY.—Grammar school extensions; West Riding Education Department, County Hall, Wakefield.

PAIGNTON.—30 houses, off Totnes Road; Mrs. Vickers.

READING.—Extensions to Park Hospital (£12,500), for the T.C.; Colier and Catley, Ltd., builders, St. Mary's Butts.

RICHMOND-ON-TEES.—Housing scheme (32), Reeth Road, for the T.C.; borough surveyor.

ROCHFORD (Essex).—Additional 30 houses, for the R.D.C.; surveyor.

ROMFORD.—Wesleyan church, Gidea Park; trustees.

RUGBY.—Extensions to St. Cross Hospital (donor, Mrs. Arthur James); W. J. Muston, secretary.

SALTBURN.—Housing scheme, for the U.D.C.; surveyor.

SKEGBY.—School; Warwick county architect.

SLOUGH.—Nursing home, Chalvey Park (£4,500), for the Nursing Fund Committee; Leslie Barrett, secretary.

SOUTHEND-ON-SEA.—Schools, Fairfax Drive, for the borough E.C.; E. A. W. Ixer, architect, 1, Mount Pleasant Stranmillis, Belfast.

SPALDING.—Extensions to museum, for the Spalding Gentlemen's Society, and extensions to isolation hospital, for the U.D.C.; W. St. Lyon Crowley, architect, 32, Hall Place.

STAFFORD.—Offices, Queensville, for British Reinforced Concrete Eng. Co., Ltd. Additions to warehouse, St. Chad's Place, for R. J. Jennings & Sons, Ltd. Presbytery, Sandon Road, for Rev. McSwiney.

STALYBRIDGE.—Extensions to Quarry Street mills, for Robert Platt, Ltd.

STOCKTON.—St. Paul's Church (eastern section), Bishopton Road; vicar.

STROUD (Glos.).—Houses, for the U.D.C.; Hall's & Co., builders, Gloucester.

SWANSEA.—80 houses, Morrison site; borough architect. 250 houses, Town Hill; borough estate agent.

TROWBRIDGE.—Casual wards, with electrical work (£2,072), for the Board of Guardians; Bigwood & Co., builders, Melksham.

UDIMORE (Rye, Sussex).—Motor works, for J. R. Gray.

WAKEFIELD.—Mining college; Education Committee architect.

WALSALL.—Combined clinic and handicraft centre, Littleton Street; secretary to the Education Committee.

WOLVERHAMPTON.—Restoration of St. John's Church and schools (£10,000); rector.

WORCESTER.—Secondary school; Director of Education, County Education Offices.

WROTHAM (Kent).—Residence, Pilgrims Road, for Sir E. Dowson, K.B.E.

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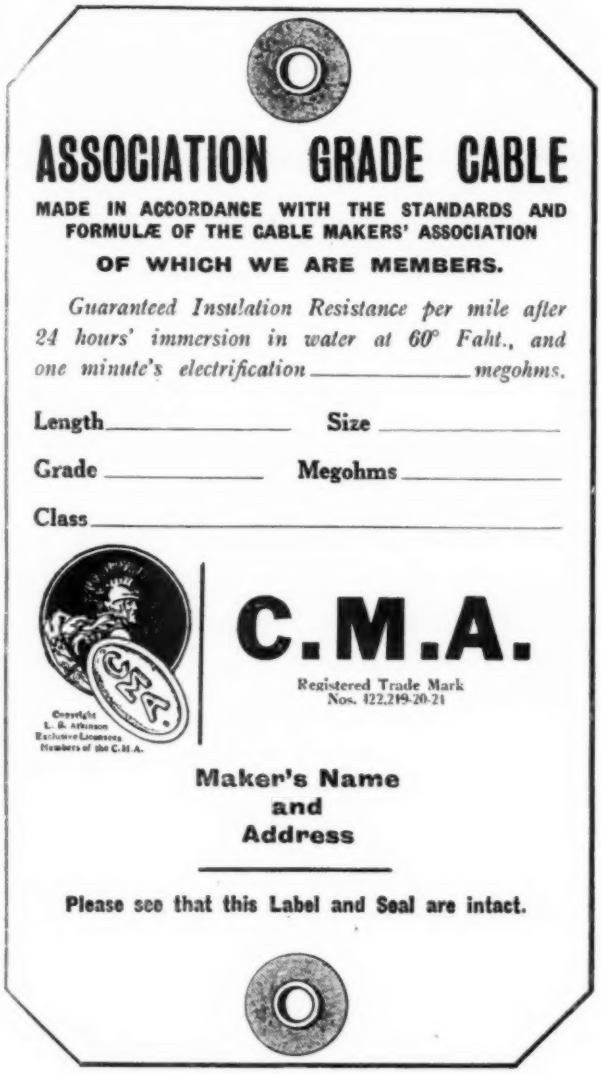
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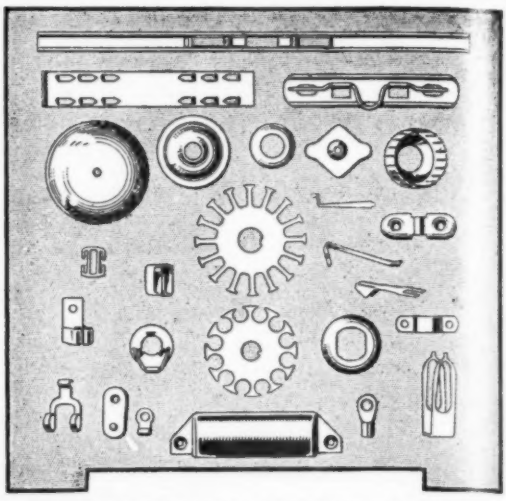

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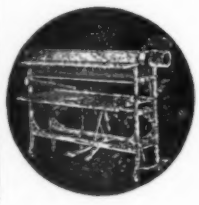

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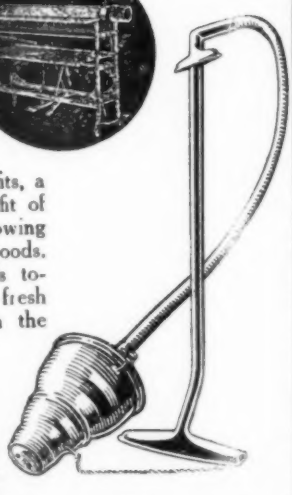

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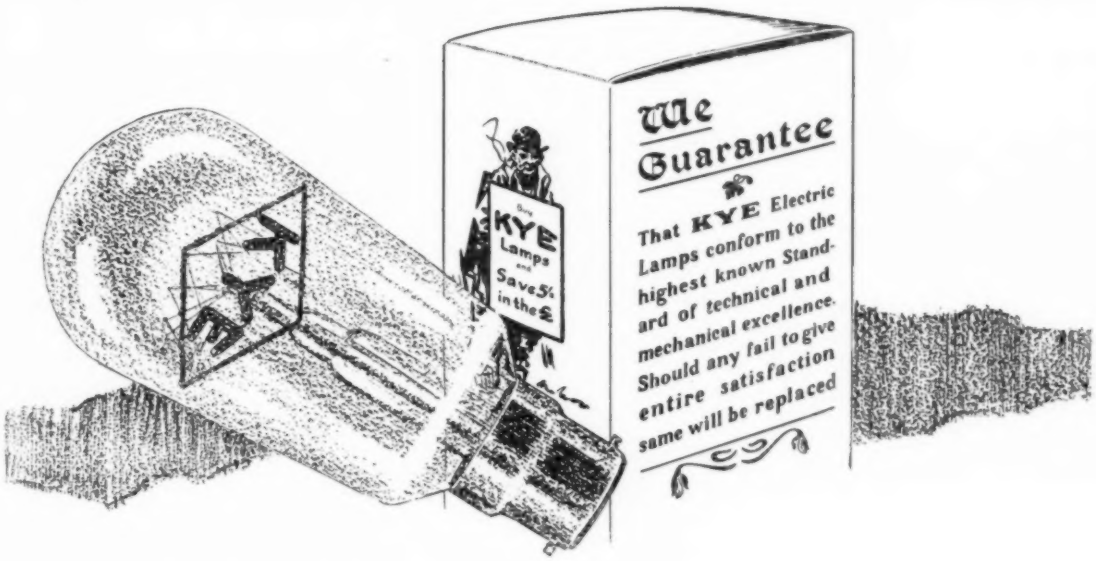
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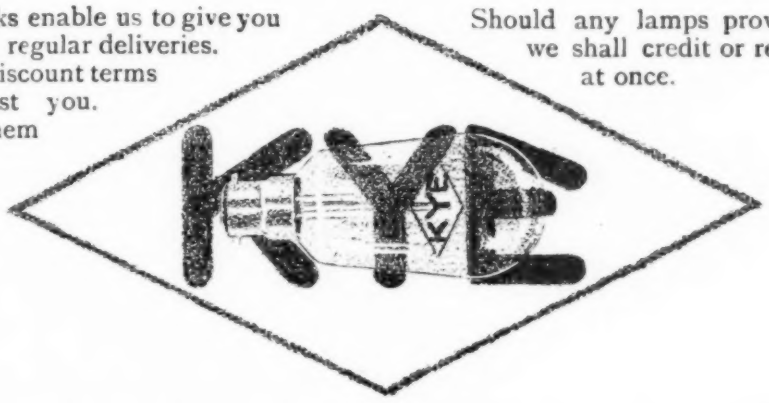

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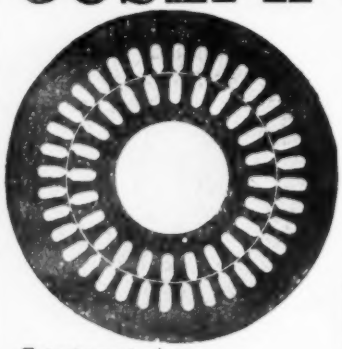

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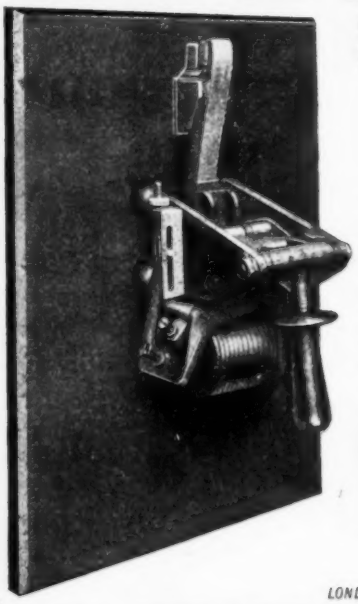

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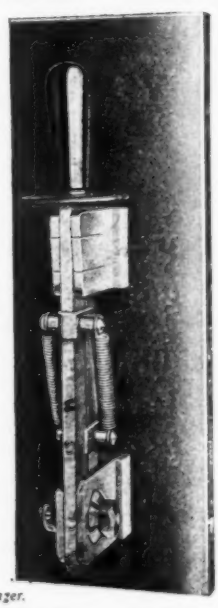

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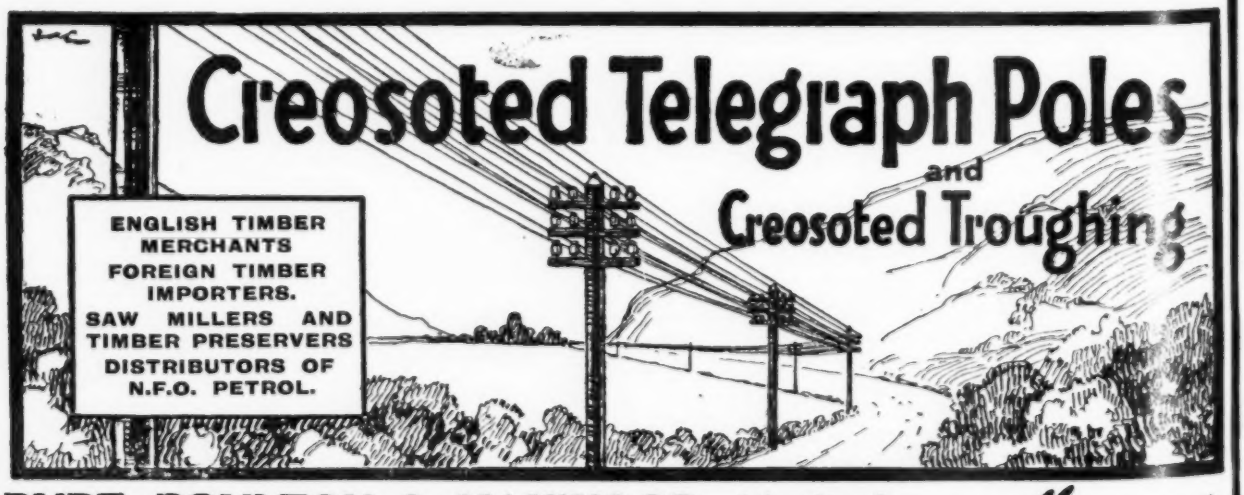

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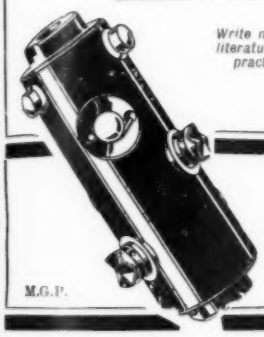

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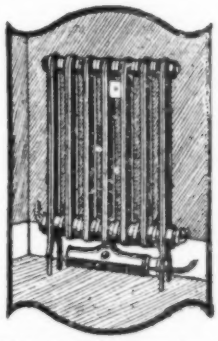

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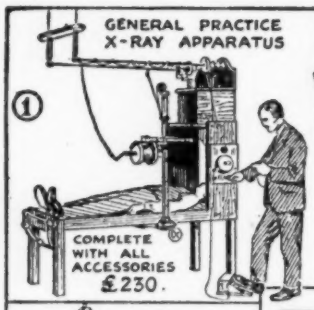
① 

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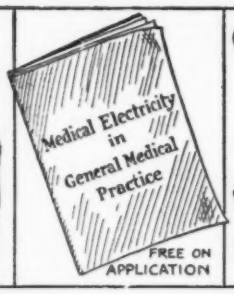

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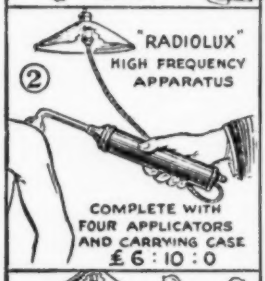
② 

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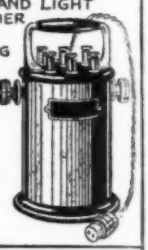
⑫ 

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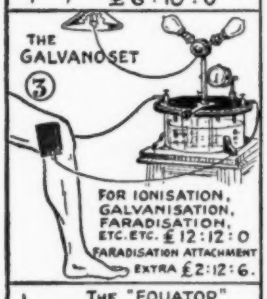
③ 

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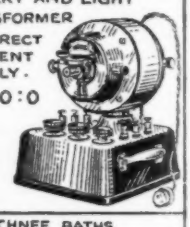
⑪ 

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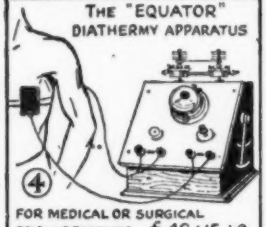
④ 

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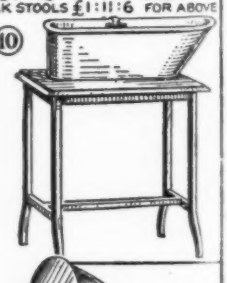
⑩ 

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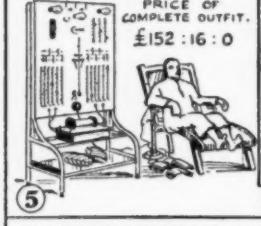
⑤ 

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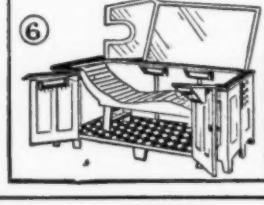
⑥ 

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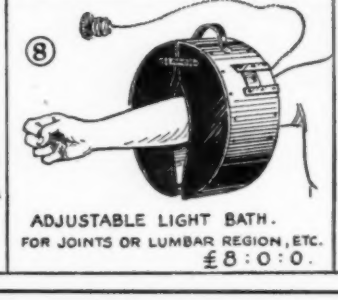
⑧ 

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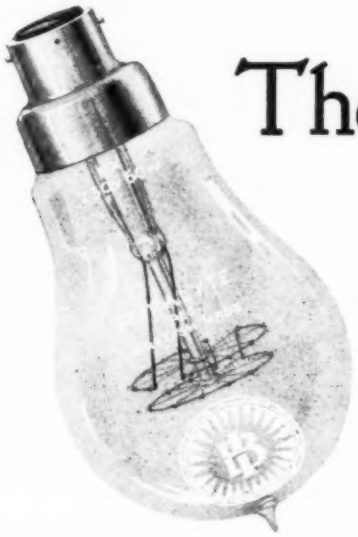

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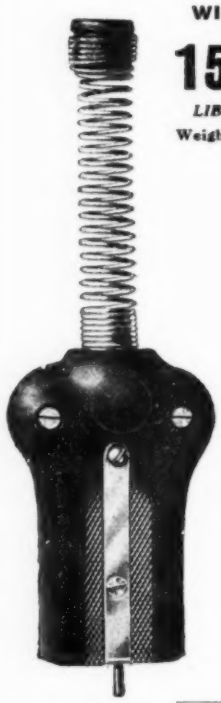

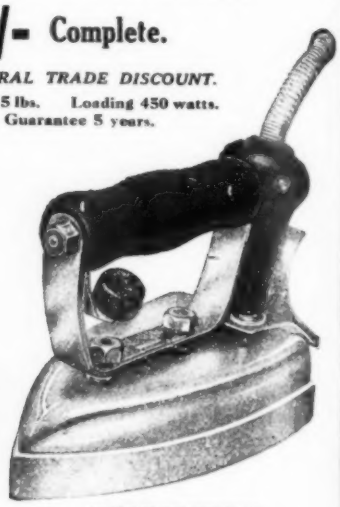

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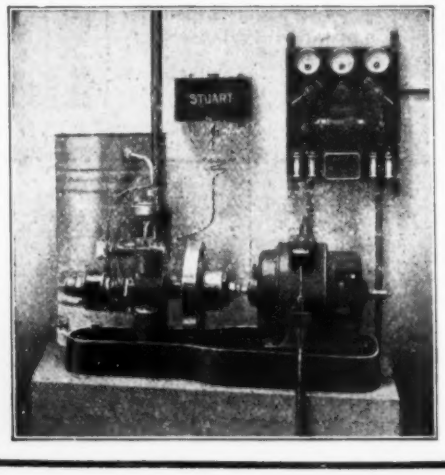
4. STRONG CONNECTION and CORD GRIP.

27, OLD BOND ST., LONDON, W.1.



The ½ K.W. Plant

for the small country house with 20 to 35 lights.

On March 20th, 1925, an "Electrical Review" Editorial says:—

. . . . the Colonies and other Telephone Administrations repeatedly order telephone equipment in Great Britain to Post Office Specifications being, satisfied with a product that has the approval of the British Post Office.

The G.P.O. has installed during the last few years over 120 Stuart Plants of various outputs from 120 watts to 3 KW. We are now executing a contract for 60 more plants.

If you want the very best have a STUART PLANT.

Ask for List No. 23R and for specifications of our other sizes: 120 watts, 1½ and 3 kW.

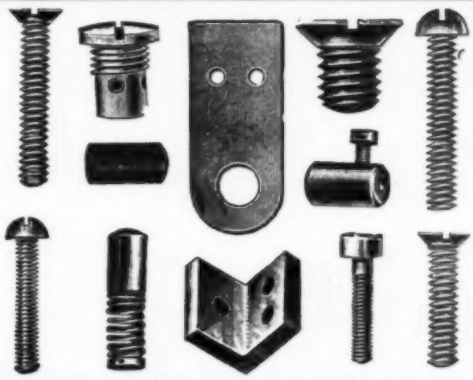
STUART TURNER, Ltd., Henley-on-Thames.

'Phone: 158.

TWENTY-FIVE YEARS ENGINEERING MANUFACTURING EXPERIENCE

"ORMOND" "ORMOND" "ORMOND" "ORMOND" ENGINEERING COMPANY Reg. App. For. "ORMOND" "ORMOND" "ORMOND"

The Finest Screw Plant in the Kingdom.



199-205, PENTONVILLE RD. KING'S CROSS. LONDON. N.1.

Factory:- Whiskin Street. Clerkenwell. E.C.1

THE MOST PROFICIENT AND UP-TO-DATE PLANT IN THE SCREW MANUFACTURING TRADE OF GT. BRITAIN.

THE BEST MEANS—

ORMOND

"ORMOND" "ORMOND" "ORMOND" "ORMOND"

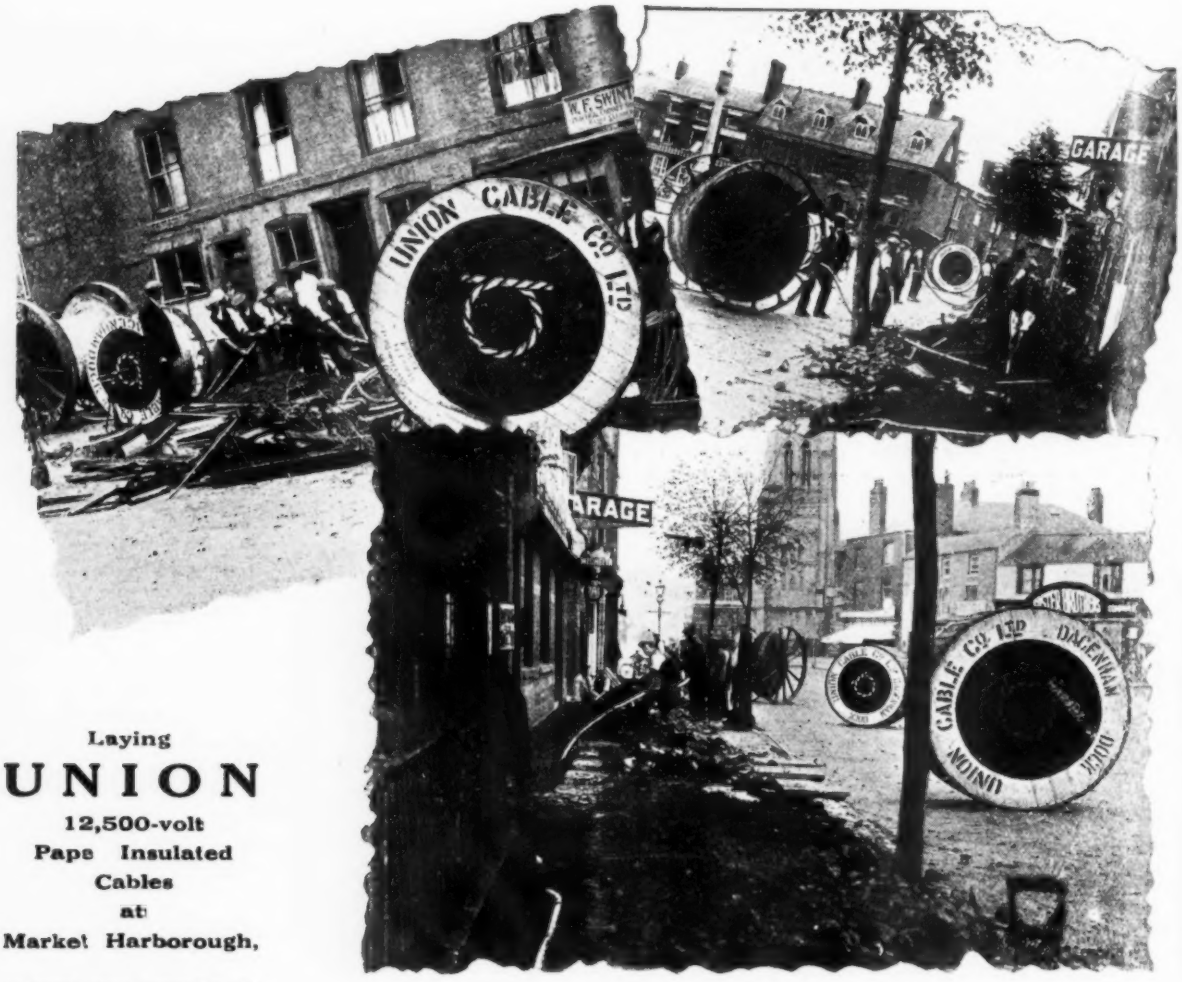
Let us solve your present problem; let us quote below your lowest, which you know is too high. No enquiry is too small or too large for our prompt attention, and we always guarantee delivery date. Our figures compete effectively with foreign markets and are lower than any in the trade. Our record of over 25 years' British manufacturing experience ensures your getting first quality products. Don't spoil the impulse—write to us—we reply by return!

The Ormond Engineering Company.

Telegrams:- "ORMONDENGI. KINCROSS."

Telephone:- CLERKENWELL 9344 (3 lines).

LOWEST QUOTATIONS IN THE TRADE — LOWER BY FAR THAN ANY OF THE FOREIGN MARKETS.



Laying

UNION

12,500-volt Pape Insulated Cables at Market Harborough,

where the supply of Electricity is being undertaken by the Kettering U.D.C., to whom the cables were supplied.

UNION CABLES

for

Extra High Tension

12,500 Volts

UNION CABLE CO. LTD. DAGENHAM DOCK. ESSEX.

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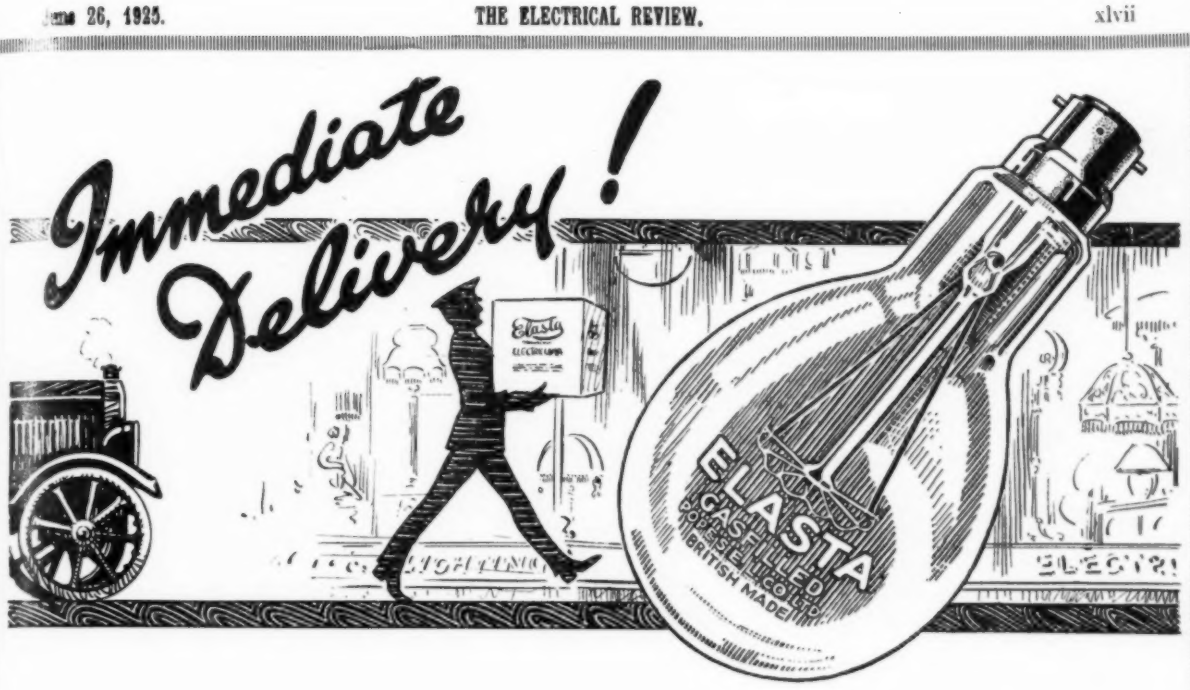


Often is immediate delivery asked for and promised—and then the goods arrive late.

Dealers who stock and sell ELASTA Lamps know from experience that the service afforded knows "no regrets."

Ample stocks are held at Head Office and at each Branch Office to meet any emergency. Whether a single lamp is wanted or hundreds, remember ELASTA Lamp Service is prepared to go "all out" to meet your requirements. ***Pope's specialize in Lamp Service.***

Elasta

ELECTRIC LAMPS

(British made in accordance with B.E.S.A. Specification No. 161).

Full particulars on request:

Pope's Electric Lamp Co., Ltd.

Head Office: **5, ARTHUR STREET, NEW OXFORD STREET, LONDON, W.C.2.**

Telephone: Gerrard 6074/5. Telegrams: "Duramentum, Westcent, London."

Branches holding stocks from whom supplies can be obtained:—

LIVERPOOL:	LEEDS:	LEICESTER:	BIRMINGHAM:	BRISTOL:	BELFAST:
21, Manesty's Lane.	20/20a, Russell St.	89, London Rd.	72, Moor St.	73, Victoria Street.	(Managers: Campbell, Gardner & Co.)
Tel.: Royal 427.	*Tel.: Leeds 22119.*	*Tel.: Leicester 128.*	*Tel.: Central 3268.*	*Tel.: Bristol 5239.*	79, King Street.
'Grams: "Duramentum."	*'Grams: "Pope's 22119."*	*'Grams: "Adrail."*		*'Grams: Pope's, 5239, Bristol.*	*Tel.: Belfast 4401.*
					'Grams: "Camergard, Belfast."

THE "ELECTRICAL REVIEW" COMPETITION.

The more attractive an advertisement the greater is its value to the advertiser. This fact is acknowledged by everyone who effects sales through the medium of displayed advertisements.

Some do not produce as good results as others. With a view to encouraging good advertising and to helping advertisers to secure the best possible results, THE ELECTRICAL REVIEW offers three prizes, one of **£100** for the best series of Six Full Pages, one of **£50** for the best Six Half Pages, and one of **£25** for the best Six Quarter Pages, appearing in the REVIEW between July 1st and December 31st, 1925. Each advertisement in the series must be different in contents and in design.

The competition is open to all electrical or allied firms or to those responsible for the design and placing of their advertisements. These advertisements should be submitted in the usual way, accompanied by blocks (if any) together with the form shown below. This form will appear in every issue after this date till the end of December, 1925, and the page on which it appears may be found by referring to the Index to Advertisers under "Electrical Review Competition."

The advertisements entered for competition will be judged for their

1.—Power of immediate attraction.
2.—Qualities compelling continued attention.
3.—Boldness of design.
4.—Artistic arrangement.

The names of those who have kindly consented to act as judges are: **Mr. J. W. BEAUCHAMP**, M.I.E.E., Director and Secretary, British Electrical Development Association (Inc.); **Mr. LEONARD L. ROBINSON**, M.Inst.C.E., M.I.E.E., M.I.Mech.E., Borough Electrical Engineer, Hackney; **Mr. LEONARD G. TATE**, M.I.E.E., Secretary, The Electrical Contractors' Association (Incorp.).

"Electrical Review" Competition.

July 1st—December 31st, 1925.

Date.....

DEAR SIRS,

I/We beg to enclose particulars of the advertisement which I/we wish to appear, in our contract space (cross out if no contract space) in the REVIEW of ....., block under separate cover (cross out if no block), this being the

..... of the series of **Six Full Page** / **Six Half Page** / **Six Quarter Page** advertisements to

appear. This advertisement is sent in subject to the usual conditions governing the insertion of advertisements in THE ELECTRICAL REVIEW, and I/we agree to abide by the decision of the judges which shall be final.

Signed ..... *(Entrant)*

Address .....

.....

*We have authorised Mr./Messrs. ..... to represent us in this competition, and if successful wish the cheque to be made payable to (to be filled in only for the first of the series)—

Name .....

Address .....

.....

Signature.....
(Of firm whose advertisement is to appear).

*This need not be filled up if the Entrant is the firm whose advertisement is to appear.

The E.R. will not hold itself responsible in any way for any dispute, of any nature whatsoever, which may arise in respect of this competition.

Entries for this competition must be accompanied by this form.

All particulars regarding advertisements may be obtained from our Advertisement Department.

RECORD

SWITCHBOARD INSTRUMENTS.

NEW MODEL

MOVING IRON AMMETERS & VOLTMETERS

Sizes: 4", 6" and 8" Dial.
Scales: Equal to the Dial Diameter.

Special Features:—

'XTRA SCALE LENGTH.
Equal to the dial diameter.
Easy to read.

'XTRA DAMPED.
Equal to Moving Coil Type.
Easy to read on fluctuating load.

'XTRA ACCURACY & FINISH.
Enhances the appearance of all Switchboards.

'XTRA GENERAL EFFICIENCY.

Specify Record's 'XTRA Type.

"British Instruments for British Industries."

THE RECORD ELECTRICAL CO., LTD.,

INSTRUMENT MAKERS,

BROADHEATH, - MANCHESTER, - ENGLAND.

Tele.: Altrincham 164. 'Grams: "Infusion, Altrincham."

LONDON OFFICE: Dacre House, Victoria Street, S.W.1.
GLASGOW OFFICE: 199, Bath Street.

Colonial Agents:—

AUSTRALIA: Messrs. The Lawrence & Hanson Electrical Co., Ltd., SYDNEY, BRISBANE, MELBOURNE.

SOUTH AUSTRALIA: Messrs. Newton, McLaren, Ltd., ADELAIDE.

NEW ZEALAND: Messrs. The Lawrence & Hanson Electrical Co., Ltd., WELLINGTON.

Contractors to H.M. Government.
Established 1814.

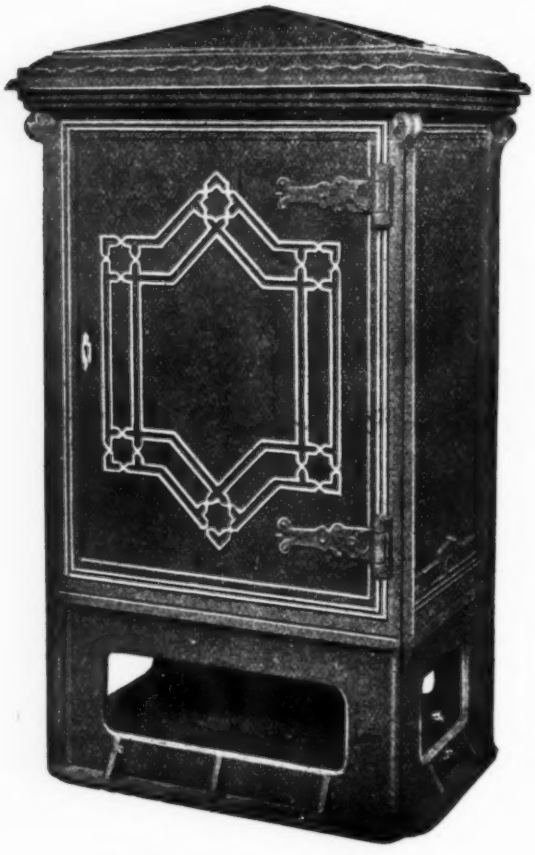
Telegrams: "QUALITY, Worcester."
Telephone No. 160 Worcester.

IMPROVED

Feeder Pillar Casings.

N.B.

Please give us your enquiries for odd sizes whether taller or shorter or



N.B.

with divided up interiors, &c., &c., also for Doors and Frames for Brick Chambers.

No. 1326. Registered Design.

We have brought out this excellent Feeder Pillar in the **seventeen** standard sizes as set out below in order to meet all ordinary requirements.

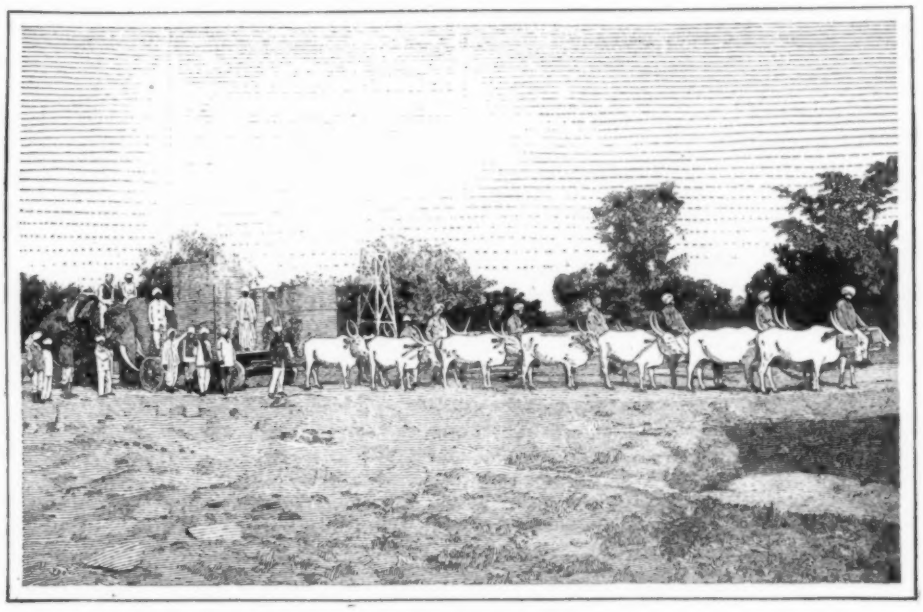
These Casings are of very nice appearance, are made up of thoroughly good castings, and are very efficiently ventilated. Each Pillar is provided with doors, hung on massive ornate malleable iron hinges pivotted on ⅝ in. dia. Brass Pins, and each door is fitted with a good Brass Lock. Sizes up to and including Size 4 have their door openings closed in by single doors, the openings in the larger sizes being closed in with multiple doors. The underground root part of all sizes measures 15 inches high and can be made detachable at a reasonable extra.

	Inside Dimensions.	Clear Openings of Doors.	Height Overall Above Ground.
Size 1 ...	19 × 12 ins.	... 33 × 15 ins.	
„ 1a ...	19 × 14 ins.	... 33 × 15 ins.	
„ 1b ...	21 × 12 ins.	... 33 × 17 ins.	45½ ins.
„ 2 ...	21 × 14 ins.	... 33 × 17 ins.	
„ 2a ...	21 × 16 ins.	... 33 × 17 ins.	
„ 2c ...	21 × 18 ins.	... 33 × 17 ins.	46½ ins.
„ 2b ...	25 × 14 ins.	... 36 × 21 ins.	
„ 3 ...	25 × 16 ins.	... 36 × 21 ins.	49 ins.
„ 3a ...	25 × 20 ins.	... 36 × 21 ins.	
„ 3b ...	31 × 16 ins.	... 36 × 27 ins.	
„ 4 ...	31 × 20 ins.	... 36 × 27 ins.	49½ ins.
„ 5 ...	36 × 24 ins.	... 42 × 33 ins.	55½ ins.
„ 6 ...	42 × 24 ins.	... 61 × 38 ins.	74½ ins.
„ 7 ...	36 × 30 ins.	... 46 × 30 ins.	
„ 8 ...	42 × 30 ins.	... 46 × 36 ins.	65½ ins.
„ 9 ...	36 × 36 ins.	... 42 × 33 ins.	
„ 10 ...	36 × 30 ins.	... 42 × 33 ins.	61½ ins.

YOUR ENQUIRIES SOLICITED.

HARDY & PADMORE, LIMITED,

ONLY ADDRESS: WORCESTER, ENGLAND.



Hauling General Electric apparatus for Cauvery Falls hydro-electric development, Mysore, India.

Shipments arrive where wanted from

GENERAL ELECTRIC

WHEREVER the power of falling water offers an opportunity for electrical service, there a means can be found to bring General Electric apparatus and give effect to that service.

The General Electric Company takes pride in allowing no natural obstacles to interfere with the carriage and installation of even its largest products.

INTERNATIONAL
GENERAL ELECTRIC COMPANY
SCHENECTADY NEW YORK, U.S.A. — 120 BROADWAY NEW YORK, U.S.A.

European, Australasian and Far Eastern Representatives Int-7-25

AUSTRALIA—Australian General Electric Co., Ltd., Wentworth Ave. and Goulburn St., Sydney, and Cor. Queen & Little Collins Sts., Melbourne

BELGIUM AND COLONIES—Societe d'Electricite et de Mecanique, S.A., 54 Chaussee de Charleroi, Brussels

CHINA—Andersen, Meyer & Co., Ltd., 4 Yuen Ming Yuen Road, Shanghai. International General Electric Co., Inc., 140 Robinon Road, Shanghai

DUTCH EAST INDIES—International General Electric Co., Inc., 59 Koepang Boulevard, Soerabaia, Java

EGYPT—British Thomson-Houston Co., Ltd., Sharia Madabegh, No. 46, A., Cairo, P.O. Box 901

FRANCE—Compagnie Francaise Thomson-Houston, 173 Boulevard Haussmann, Paris 8me. International General Electric Company, Inc., 4 Rue d'Agueseau, Paris 8me.

GREAT BRITAIN AND IRELAND—British Thomson-Houston Co., Ltd., Rugby, England. International General Electric Co., Inc., Crown House Aldwych, London, W. C., 2

GREECE AND COLONIES—Compagnie Francaise Thomson-Houston, 173 Boulevard Haussmann, Paris 8me.

HOLLAND—Mijnssen & Co., Keizersgracht 205, Amsterdam

INDIA—International General Electric Co., Inc., 8-1 Clive Building, Calcutta; Exchange Building, Ballard Estate, Bombay

ITALY AND COLONIES—Compagnie Generale di Elettricita, Via Borgognone 40, Milan (24)

JAPAN—International General Electric Co., Inc., Chiyoda Kwan, Minami Denma-Cho, Kyobashiku, Tokyo; P.O. Box 24, Osaka; Shibaura Engineering Works, 1 Shibamacho Shibaku, Tokyo; Tokyo Electric Co., Ltd., Kawasaki, Kanagawa-Ken

NEW ZEALAND—National Electrical & Engineering Co., Ltd., Wellington; Auckland, Dunedin, Christchurch

PHILIPPINE ISLANDS—Pacific Commercial Co., Manila

PORTO RICO—International General Electric Co., Inc., San Juan

PORTUGAL AND COLONIES—Sociedade Iberica de Construcciones Electricas, Lda., Praca dos Restauradores 76-1°, Lisbon

SOUTH AFRICA—South African General Electric Co., Ltd., G-E Building, Marshall & Simmonds Sts., Johannesburg, Transvaal; Tyne Building, Cor. Long & Dorp Sts., Capetown

SPAIN AND COLONIES—Sociedad Iberica de Construcciones Electricas, Apartado 990, Madrid, Rambla de Cataluna 13, Barcelona; Apartado 330; Bilbao

SWITZERLAND—Trolliet Freres, 44, Rue du Stand Prolongee, Geneve

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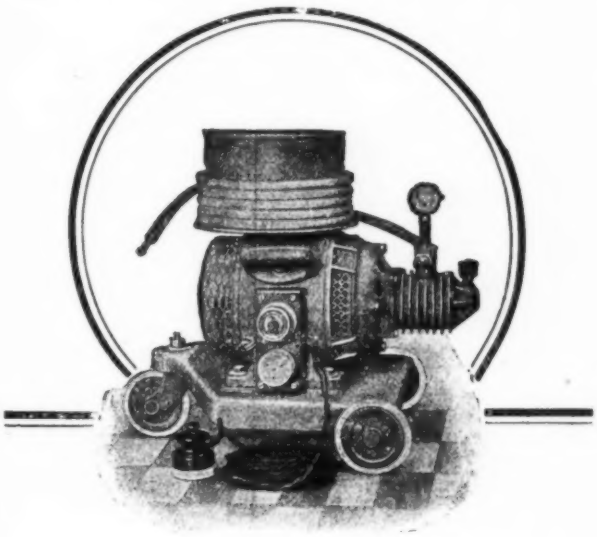

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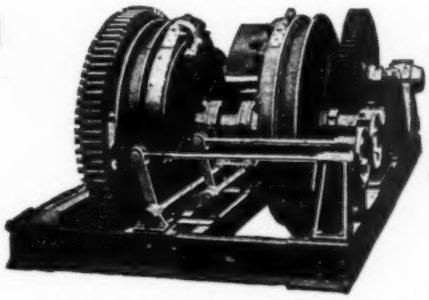

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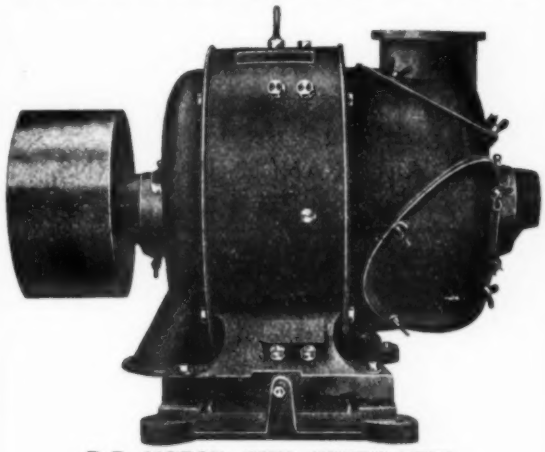

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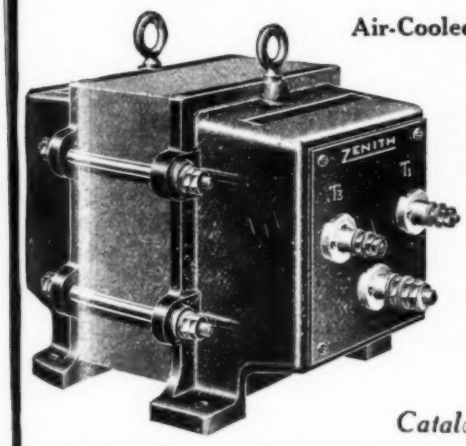

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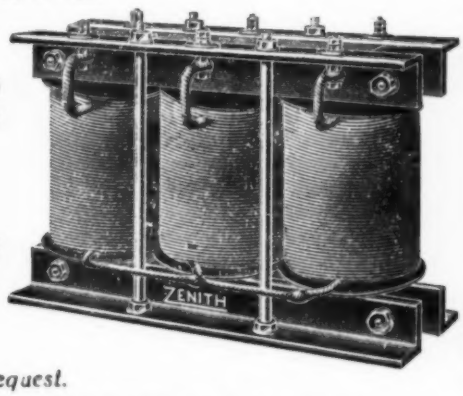

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E18

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THIS is not an announcement *re* Kruschen, but at this time of the year with the approach of the dog days, most people commence to think of holidays.

We wish you a pleasant time and an enjoyable rest, but before you go for holidays remember that September will soon be here, so why not order your time switches NOW and be sure of delivery by the time the rush comes. Has it occurred to you also, that August is the month for fitting programme ringers in the schools—Venner's of course.

Not wishing to annoy you with business announcements during the holiday season, we have decided to make this positively our last appearance before the Autumn. Better cut out the message below and pin it on your desk calendar just to remind yourself to place your order before you go away.

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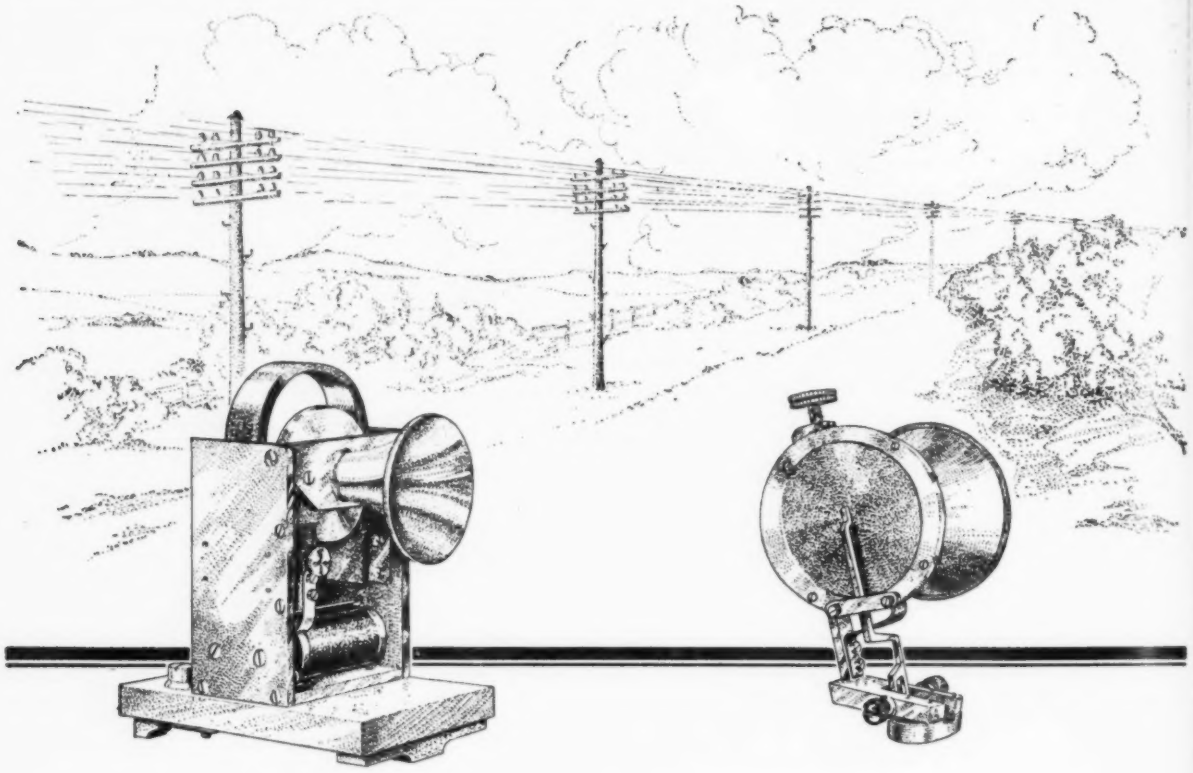

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